HITACHI

SERVICE MANUAL

NTSC | AP32F Chassis

PA No. 0046

50EX12B
50EX13K

R/C TYPE CLU-413UI

This service manual gives differences between the 50EX12B/13K and 50EX10B/8K. For any other information, see the 50EX10B/8K Service Manual PA No. 0034 issued in June 1994.

CONTENTS

CUSTOMER PICTURE AND SOUND ADJUSTMENT 2
CUSTOMER CONVERGENCE ADJUSTMENT 3
NEW CIRCUIT DESCRIPTION 3
WIRING DIAGRAM 4
EXPLODED VIEW 6
REPLACEMENT PARTS LIST 7

CAUTION: Before servicing this chassis, it is important that the service technician read the "Safety Precaution" and "Product Safety Notices" in Service Manual PA No. 0034.

This service manual is intended for qualified service technicians; it is not meant for the casual do-it-yourselfer. Qualified technicians have the necessary test equipment and tools, and have been trained to properly and safely repair complex products such as those covered by this manual.

Improperly performed repairs can adversely affect the safety and reliability of the product and may void the warranty. If you are not qualified to perform the repair of this product properly and safely, you should not risk trying to do so and refer the repair to a qualified service technician.

WARNING
Lead in solder used in this product is listed by the California Health and Welfare agency as a known reproductive toxicant which may cause birth defects or other reproductive harm (California Health and Safety Code, Section 25249.5). When servicing or handling circuit boards and other components which contain lead in solder, avoid unprotected skin contact with the solder. Also, when soldering do not inhale smoke or fumes produced.

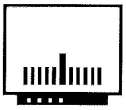
SPECIFICATIONS AND PARTS ARE SUBJECT TO CHANGE FOR IMPROVEMENT

PROJECTION COLOR TELEVISION

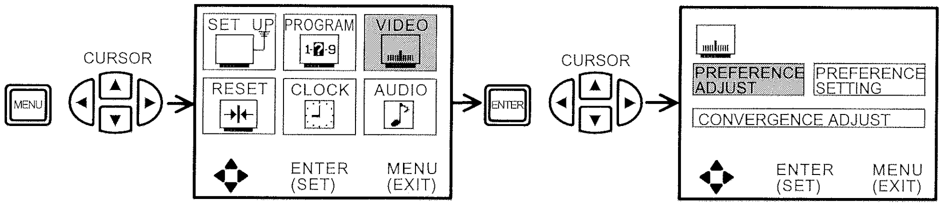
MARCH 1995 HHEA - MANUFACTURING DIVISION

ADJUSTING FOR PICTURE AND SOUND FUNCTIONS

VIDEO

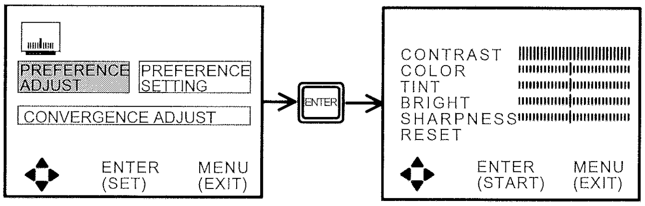


Select VIDEO to adjust picture settings, improve quality, and to adjust convergence.


MENU
CURSOR
SET UP
PROGRAM
VIDEO
RESET
CLOCK
AUDIO
ENTER (SET)
MENU (EXIT)
ENTER
CURSOR
PREFERENCE ADJUST
PREFERENCE SETTING
CONVERGENCE ADJUST
ENTER (SET)
MENU (EXIT)

PREFERENCE ADJUST

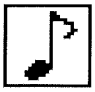
Use this feature to adjust contrast, color, etc.


PREFERENCE ADJUST
PREFERENCE SETTING
CONVERGENCE ADJUST
ENTER (SET)
MENU (EXIT)
ENTER
CONTRAST
COLOR
TINT
BRIGHT
SHARPNESS
RESET
ENTER (START)
MENU (EXIT)

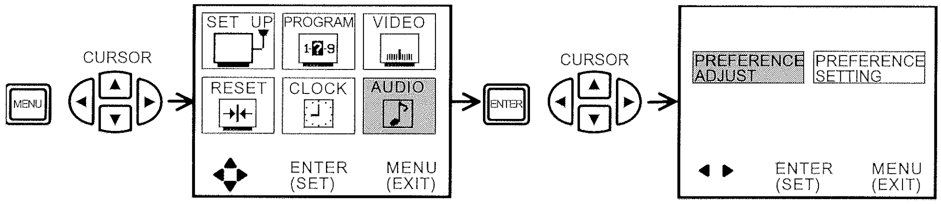
Press the CURSOR buttons to select and make adjustments.
The functions to be adjusted will be in magenta.

CONTRAST:	Use this function to change the contrast between black and white levels in the picture. This adjustment will only affect the picture when PICTURE SETTING AI is OFF. (Use PREFERENCE SETTING to turn AI off.)
COLOR:	Use this function to adjust the level of color in the picture.
TINT:	Use this function to adjust flesh tones so that they appear natural.
BRIGHT:	Use this function to adjust overall picture brightness.
SHARPNESS:	Use this function to adjust the amount of fine detail in the picture. This adjustment will only affect the picture when PICTURE SETTING AI is OFF. (Use PREFERENCE SETTING to turn AI off.)
RESET:	When RESET is selected, press ENTER to return video adjustments to factory preset conditions.

AUDIO

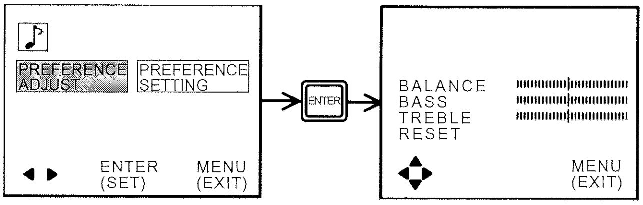


Select AUDIO to adjust the TV to your preference, to improve the sound quality, and to select special sound effects.


MENU
CURSOR
SET UP
PROGRAM
VIDEO
RESET
CLOCK
AUDIO
ENTER (SET)
MENU (EXIT)
ENTER
CURSOR
PREFERENCE ADJUST
PREFERENCE SETTING
ENTER (SET)
MENU (EXIT)

PREFERENCE ADJUSTMENT

Use this to set balance, bass, and treble.

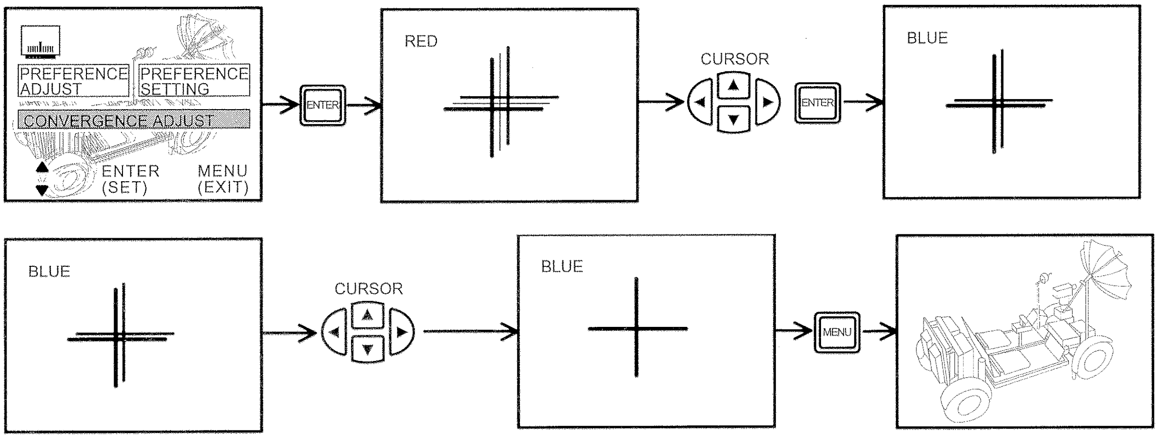

PREFERENCE ADJUST
PREFERENCE SETTING
ENTER (SET)
MENU (EXIT)
ENTER
BALANCE
BASS
TREBLE
RESET
MENU (EXIT)

Press the CURSOR buttons to select and make adjustments. The function to be adjusted will be in magenta.

BALANCE:	This function will control the left to right balance of the TV internal speakers, the AUDIO TO HI-FI output, and the surround speakers.
BASS:	This function controls the low frequency audio to all speakers.
TREBLE:	This function controls the high frequency audio to all speakers.
RESET:	When RESET is selected, press ENTER to return audio adjustments to factory preset conditions.

CONVERGENCE ADJUSTMENT

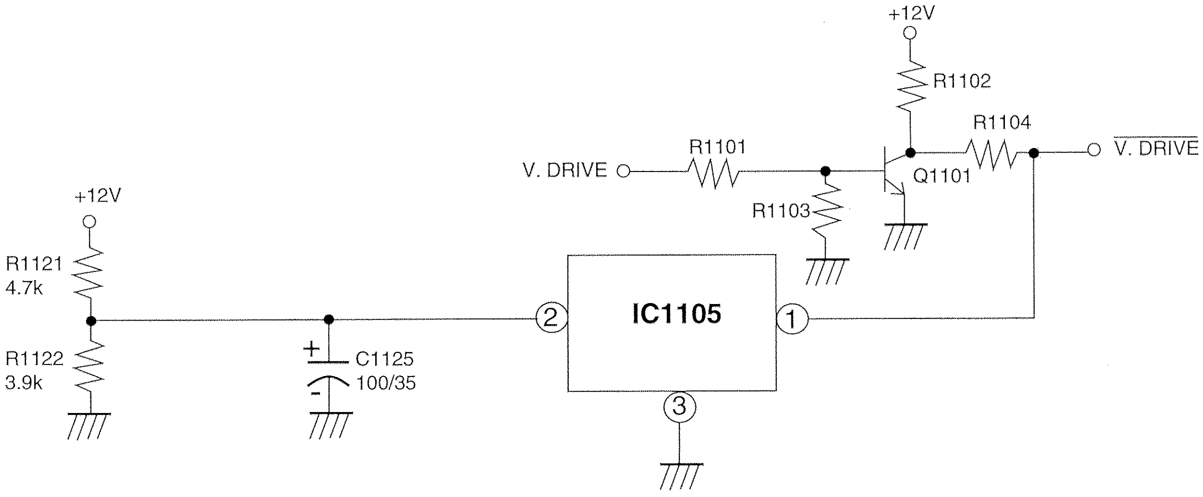
Press MENU on the remote control for On Screen Display. Use the CURSOR buttons to select VIDEO and then press ENTER.


PREFERENCE ADJUST
PREFERENCE SETTING
CONVERGENCE ADJUST
ENTER (SET)
MENU (EXIT)
ENTER
RED
CURSOR
ENTER
BLUE
BLUE
CURSOR
BLUE
MENU

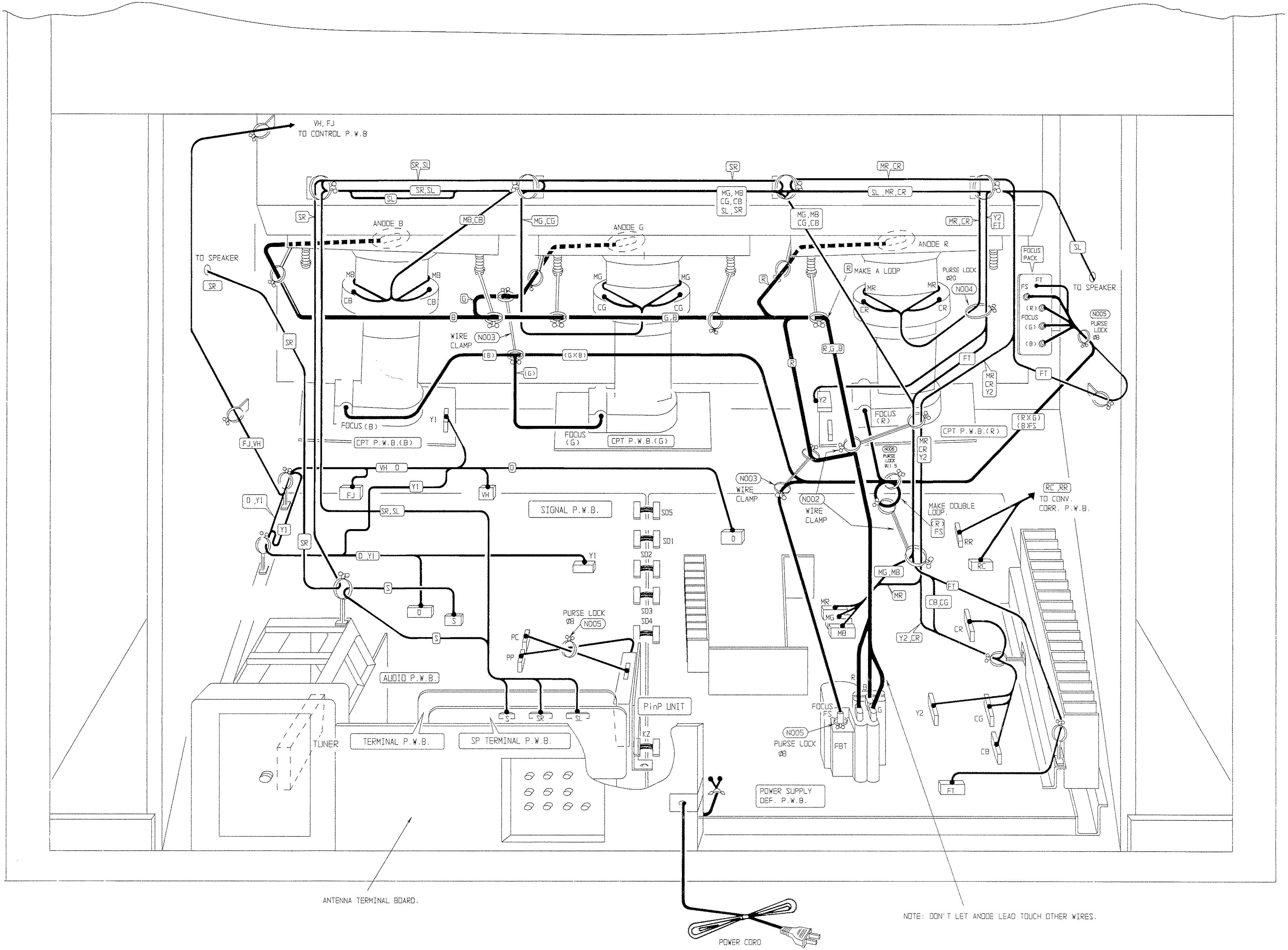
Press the CURSOR ▲, ▼ to move the color displayed up or down.
Press the CURSOR ◀, ▶ to move the color displayed left or right.
Press ENTER to change the color.
Press MENU to exit.

NEW CIRCUIT DESCRIPTION

The AP32F Chassis incorporates a new Convergence Mute Circuit (IC1105) which improves the performance of the convergence amplifier IC's, (IC1301, IC1326, and IC1351). Reset IC1105 will disable correction waveforms by means of $\overline{\text{V. DRIVE}}$ at power on and off or anytime supply voltage drops below the predetermined level determined by voltage divider R1121 and R1122 (approximately 5.4V). This disable function will reduce the current drain on the amplifier IC's which improves reliability.

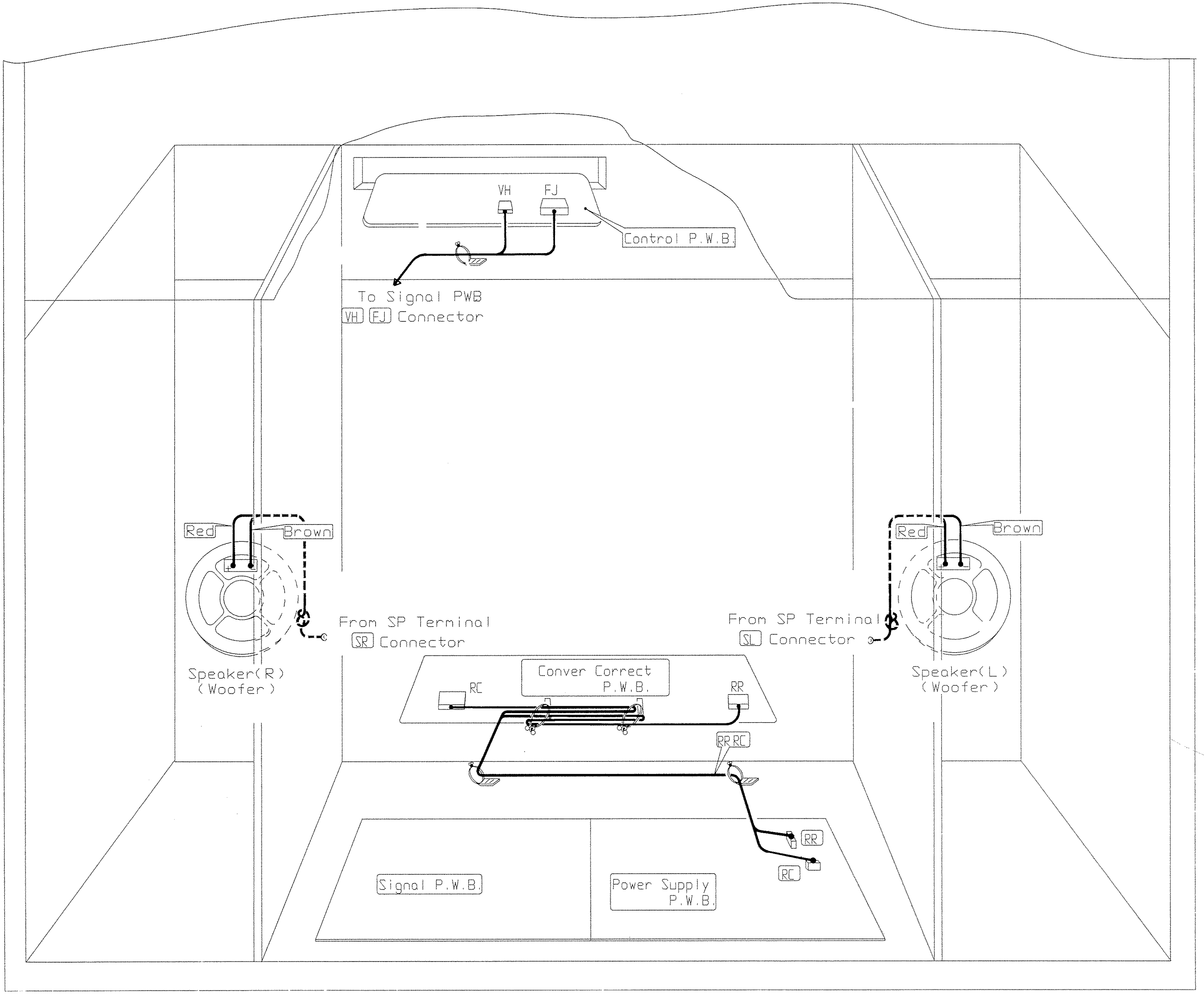

+12V
R1102
R1104
V. DRIVE
R1101
Q1101
V. DRIVE
R1103
+12V
R1121
4.7k
R1122
3.9k
+
C1125
100/35
-
IC1105
2
1
3

50EX12B/13K WIRING DRESS DRAWING.

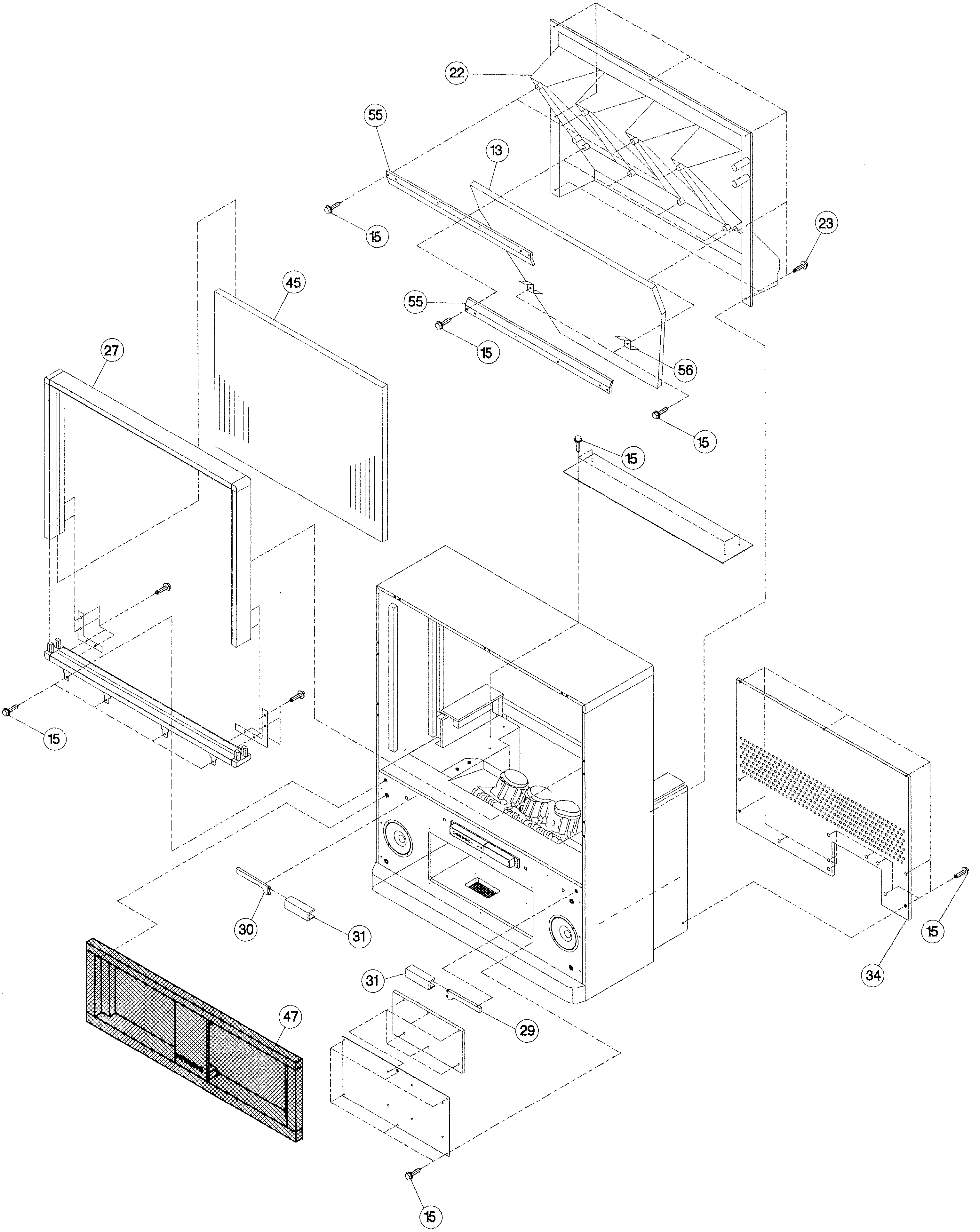

VH, FJ
TO CONTROL P.W.B
SR,SL
SR,SL
SL
SR
MB,CB
MG,CG
ANODE B
ANODE G
ANODE R
SR
MG, MB
CG, CB
SL, SR
MR,CR
SL, MR,CR
MG, MB
CG, CB
MR,CR
Y2
FT
FOCUS
PACK
SL
TO SPEAKER
TO SPEAKER
SR
MB
MB
CB
CB
MG
MG
CG
CG
MR
MR
CR
CR
R
MAKE A LOOP
PURSE LOCK
Ø20
N004
FT
FS
(R)
FOCUS
(G)
(B)
N005
PURSE
LOCK
Ø8
G
B
G,B
WIRE
CLAMP
N003
(B)
(G X B)
(G)
R
R,G,B
FT
FT
MR
CR
Y2
Y2
FOCUS
(R)
(R X G)
(B)FS
CPT P.W.B.(R)
MR
CR
Y2
N005
PURSE
LOCK
Ø11.5
FOCUS (B)
Y1
CPT P.W.B.(B)
FOCUS
(G)
CPT P.W.B.(G)
FJ,VH
VH D
D
Y1
FJ
VH
N003
WIRE
CLAMP
N002
WIRE
CLAMP
MAKE DOUBLE
LOOP.
(R)
FS
RR
RC
RC, RR
TO CONV.
CORR. P.W.B.
D,Y1
Y1
SR
SR,SL
SIGNAL P.W.B.
SD5
SD1
SD2
SD3
SD4
D
D,Y1
Y1
MG,MB
FT
MR
CB,CG
CR
Y2,CR
MR
MG
MB
S
D
S
S
PURSE LOCK
Ø8
N005
PC
PP
AUDIO P.W.B.
R
B
G
FOCUS
FS
N005
PURSE LOCK
Ø8
FBT
Y2
CG
CB
FT
S
SR
SL
PinP UNIT
KZ
TUNER
TERMINAL P.W.B.
SP TERMINAL P.W.B.
POWER SUPPLY
DEF. P.W.B.
ANTENNA TERMINAL BOARD.
POWER CORD

NOTE: DON'T LET ANODE LEAD TOUCH OTHER WIRES.

5C .12B/13K WIRING DRESS DRAW


VH
FJ
Control P.W.B.
To Signal PWB
VH FJ Connector
Red
Brown
From SP Terminal
SR Connector
Speaker(R)
(Woofer)
Red
Brown
From SP Terminal
SL Connector
Speaker(L)
(Woofer)
Conver Correct
P.W.B.
RC
RR
RR RC
RR
RC
Signal P.W.B.
Power Supply
P.W.B.

EXPLODED VIEW 50EX12B/50EX13K (1/3)


22
55
13
15
23
45
55
15
27
56
15
15
15
15
30
31
34
31
47
29
15

REPLACEMENT PARTS LIST

PRODUCT SAFETY NOTE: Components marked with a ⚠ have special characteristics important to safety. Before replacing any of these components, read carefully, the PRODUCT SAFETY NOTICE of this Service Manual. Don't degrade the safety of the receiver through improper servicing.

ABBREVIATIONS

Capacitors:
CD: Ceramic Disc
PF: Polyester Film
EL: Electrolytic
PP: Polypropylene
PR: Paper
TA: Tantalum
TM: Trimmer

Resistors:
CF: Carbon Film
CC: Carbon Composition
MF: Metal Oxide Film
VR: Variable Resistor
WW: Wire Wound
FR: Fuse Resistor
MG: Metal Glazed

Semiconductors:
TR: Transistor
DI: Diode
ZD: Zener Diode
VA: Varistor
TH: Thermistor
IC: Integrated Circuit

SYMBOL NO.	PART NO.	PART DESCRIPTION	SYMBOL NO.	PART NO.	PART DESCRIPTION
		CAPACITORS			
C1125	0284436R	EL 100µF 35V			
C3530	N/A	N/A			
C3524	N/A	N/A			
		RESISTORS			
R3643	0700047M	CF 3.3kΩ +-5% 1/16W			
R3632	0100081M	CF 4.7kΩ +- 5% 1/8W			
R3581	0700059M	CF 27kΩ +- 5% 1/16W			
R3590	N/A	N/A			
R3582	0700067M	CF 100kΩ +- 5% 1/16W			
R3583	0700063M	CF 47kΩ +- 5% 1/16W			
R3524A	0100083M	CF 5.6kΩ +- 5% 1/8W			
R5630	0179536M	MG 1MΩ +- 5% 1/8W			
R5546	0700055M	CF 12kΩ +- 5% 1/16W			
R809B	0100065M	CF 1kΩ +- 5% 1/8W			
R1121	0700049M	CF 4.7kΩ +- 5% 1/16W			
R1122	0700048M	CF 3.9kΩ +- 5% 1/16W			
		DIODES			
D802	2338321M	DI 1SS270			
		IC's			
IC0001	CP00192	M37204MC-752SP			
IC1105	CP01631R	ICL-PST9142			
		COMPOUND COMPONENTS			
M302	JP00241	KS-001S (P-in-P Module)			
		MISCELLANEOUS			
4	NA03232	Lens CRT Metal			
13	KS00043	Mirror			
15	4520771	4 x 18 Tapping Screw w/ Washer			
21	QD01321	Cabinet Ass'y (50EX12B)			
21	QD01322	Cabinet Ass'y (50EX13K)			
22	QD01531	Back Cover			
23	H810202	8 x 3/4" Pan Head Drywall Screw			
27	NT00077	Screen Frame			
29	H310901	Extrusion End Cap (R)			
30	H310902	Extrusion End Cap (L)			
31	H310931	Deco Panel			
34	H512176	Rear Cover Ass'y			
45	3189764	Screen Ass'y			
47	H310921	Speaker Grill			
55	H420671	Mirror Metal A			
56	H420681	Mirror Metal B			
57	H420711	Unit Cover			
E101	2444877	Deflection Yoke			
E301	HL00222	R/C CLU-413UI			
N201	QR02301	AP32F I/B			

HITACHI

HITACHI

PA

No. 0034

55EX9K 50EX10B
50EX8K 50EX11BV

SERVICE MANUAL

NTSC

AP32 Chassis

R/C: CLU-682GJ

CONTENTS

SAFETY PRECAUTIONS 3
SERVICING PRECAUTIONS 6
TECHNICAL CAUTIONS 9
SPECIFICATIONS 10
CIRCUIT PROTECTION 10
GENERAL INFORMATION 11
CUSTOMER PICTURE AND SOUND ADJUSTMENTS 12
SELF CHECK REPAIR CODES 14
CUSTOMER CONVERGENCE ADJUSTMENT 14
CAUTIONS WHEN CONNECTING/DISCONNECTING THE HV CONNECTOR 15
SERVICE ADJUSTMENTS 16
BASIC CIRCUIT DIAGRAM 47
WAVEFORMS AT EACH SECTION 70
TROUBLESHOOTING 74
PROTECTION CIRCUIT BLOCK DIAGRAM 84
BLOCK DIAGRAM 85
PRINTED CIRCUIT BOARDS 87
WIRING DIAGRAM 99
EXPLODED VIEW 109
REPLACEMENT PARTS LIST 114

CAUTION: Before servicing this chassis, it is important that the service technician read the “Safety Precaution” and “Product Safety Notices” in this Service Manual.

SAFETY NOTICE
USE ISOLATION TRANSFORMER WHEN SERVICING

Components having special safety characteristics are identified by a ⚠on the schematics and on the parts list in this Service Data and its supplements and bulletins. Before servicing the chassis, it is important that the service technician read and follow the “Safety Precautions” and “Product Safety Notices” in this Service Manual.

*For continued x-radiation protection, replace picture tube with original type of Hitachi approved equivalent type.

SPECIFICATIONS AND PARTS ARE SUBJECT TO CHANGE FOR IMPROVEMENT

PROJECTION COLOR TELEVISION

June 1994 HHEA - MANUFACTURING DIVISION

SAFETY NOTICE
USE ISOLATION TRANSFORMER WHEN SERVICING

Components having special safety characteristics are identified by a △ on the schematics and on the parts list in this Service Data and its supplements and bulletins. Before servicing this chassis, it is important that the service technician read and follow the "Safety Precautions" and "Product Safety Notices" in this Service Manual.

*For continued x-radiation protection, replace picture tube with original type or Hitachi approved equivalent type.

This service manual is intended for qualified service technicians; it is not meant for the casual do-it-yourselfer. Qualified technicians have the necessary test equipment and tools, and have been trained to properly and safely repair complex products such as those covered by this manual.

Improperly performed repairs can adversely affect the safety and reliability of the product and may void warranty. If you are not qualified to perform the repair of this product properly and safely, you should not risk trying to do so and refer the repair to a qualified service technician.

WARNING

Lead in solder used in this product is listed by the California Health and Welfare agency as a known reproductive toxicant which may cause birth defects or other reproductive harm (California Health and Safety Code, Section 25249.5).

When servicing or handling circuit boards and other components which contain lead in solder, avoid unprotected skin contact with solder. Also, when soldering do not inhale any smoke or fumes produced.

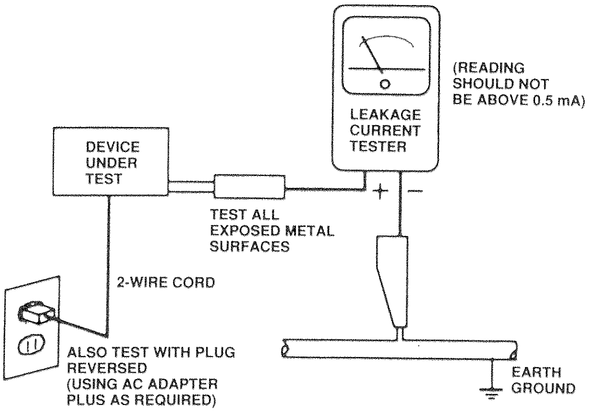
This television receiver provides display of television closed captioning in accordance with section 15.119 of the FCC rules.

CAUTION

Use extreme care when troubleshooting the 50EX11BV main chassis. This model has a unique CRT mounting arrangement. There is no support to hold the chassis in a vertical position. Make sure the chassis is secure or the chassis may fall forward and damage the CRT's.

SAFETY PRECAUTIONS

1. Before returning an instrument to the customer, always make a safety check of the entire instrument, including but not limited to the following items:
   a. Be sure that no built-in protective devices are defective and/or have been deleted during servicing. (1) Protective shields are provided on this chassis to protect both the technician and the customer. Correctly replace all missing protective shields, including any removed for servicing convenience. (2) When reinstalling the chassis and/or other assembly in the cabinet, be sure to put back in place all protective devices, including but not limited to, nonmetallic control knobs, insulating fishpapers, adjustment and compartment covers/shields, and isolation resistor/capacitor networks. **Do not operate this instrument or permit it to be operated without all protective devices correctly installed and functioning. Servicers who defeat safety features or fail to perform safety checks may be liable for any resulting damage.**
   b. Be sure that there are no cabinet openings through which an adult or child might be able to insert their fingers and contact a hazardous voltage. Such openings include, but are not limited to (1) spacing between the picture tube and cabinet mask, (2) excessively wide cabinet ventilation slots, and (3) an improperly fitted and/or incorrectly secured cabinet back cover.
   c. **Antenna Cold Check** — With the instrument AC plug removed from any AC source, connect an electrical jumper across the two AC plug prongs. Place the instrument AC switch in the on position. Connect one lead of an ohmmeter to the AC plug prongs tied together and touch the other ohmmeter lead in turn to each tuner antenna input exposed terminal screw and, if applicable, to the coaxial connector. If the measured resistance is less than 1.0 megohms or greater than 5.2 megohms, an abnormality exists that must be corrected before the instrument is returned to the customer. Repeat this test with the instrument AC switch in the off position.
   d. **Leakage Current Hot Check** — With the instrument completely reassembled, plug the AC line cord directly into a 120V AC outlet. (Do not use an isolation transformer during this test.) Use a leakage current tester or a metering system that complies with American National Standards Institute (ANSI) C101.0 Leakage Current for Appliances and Underwriters Laboratories (UL) 1410, (50.7). With the instrument AC switch first in the on position and then in the off position, measure from a known earth ground (metal waterpipe, conduit, etc.) to all exposed metal parts of the instrument (antennas, handle bracket, metal cabinet, screw heads, metallic overlays, control shafts, etc.), especially any exposed metal parts that offer an electrical return path to the chassis. Any current measured must not exceed 0.5 milliamps. Reverse the instrument power cord plug in the outlet and repeat test.

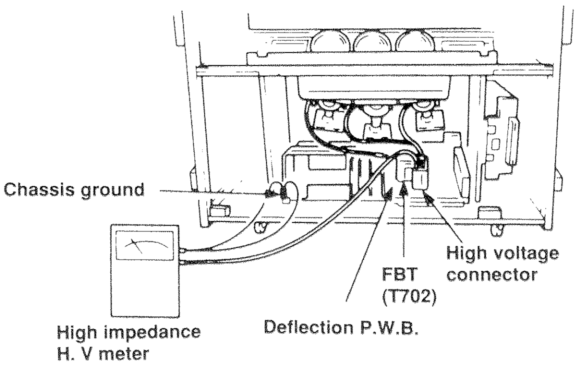

(READING SHOULD NOT BE ABOVE 0.5 mA)
LEAKAGE CURRENT TESTER
DEVICE UNDER TEST
+
−
TEST ALL EXPOSED METAL SURFACES
2-WIRE CORD
ALSO TEST WITH PLUG REVERSED (USING AC ADAPTER PLUS AS REQUIRED)
EARTH GROUND

AC Leakage Test

ANY MEASUREMENTS NOT WITHIN THE LIMITS SPECIFIED HEREIN INDICATE A POTENTIAL SHOCK HAZARD THAT MUST BE ELIMINATED BEFORE RETURNING THE INSTRUMENT TO THE CUSTOMER OR BEFORE CONNECTING THE ANTENNA OR ACCESSORIES.

   e. **High Voltage** — This receiver is provided with a hold down circuit for clearly indicating that voltage has increased in excess of a predetermined value. Comply with all notes described in this Service Manual regarding this hold down circuit when servicing, so that this hold down circuit may correctly be operated.
   f. **Serviceman Warning** — With minimum contrast and brightness, operating high voltage in this receiver is lower than **31.6kV.** In case any component having influence on high voltage is replaced, confirm that high voltage with minimum contrast and brightness is lower than **31.6kV.**
   To measure H.V. use a high impedance H.V. meter. Connect (−) to chassis earth and (+) to the CRT anode button. (See the following connection diagram.)

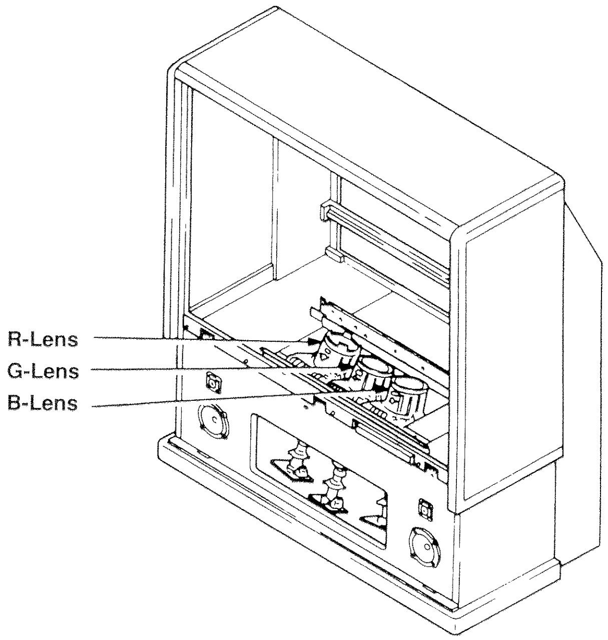
Note: Turn power switch off without fail before the connection to the anode button is made.

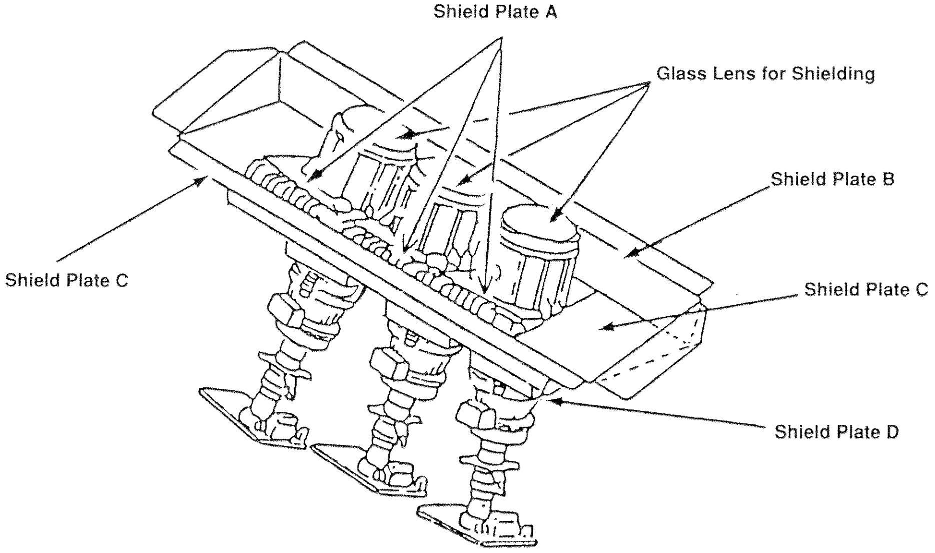


g. **X-radiation — TUBE:** The primary source of X- radiation in this receiver is the picture tube. The tube utilized for the above mentioned function in this chassis is specially constructed to limit X-radiation emissions.
For continued X-radiation protection, the replacement tube must be the same type as the original, HITACHI approved type.
When troubleshooting and making test measurements in a receiver with a problem of excessive high voltage, avoid being unnecessarily close to the picture tube and the high voltage component.
Do not operate the chassis longer than is necessary to locate the cause of excessive voltage.

h. **X-Radiation Shield —**

1) This receiver is provided X-ray shield plates for the protection of X-radiation. Do not remove X-ray shield plates A, B, C, or D shown in Fig. 1 unnecessarily, when troubleshooting and/or making test measurements.
2) To prevent X-radiation, after replacement of picture tube and lens, confirm these components to be fixed correctly to bracket and cabinet, and not to be taken off easily.





Detailing X-radiation shield.
Fig. 1

2. Read and comply with all caution and safety-related notes on or inside the receiver cabinet, on the receiver chassis, or on the picture tube.

3. **Design Alteration Warning** — Do not alter or add to the mechanical or electrical design of this TV receiver. Design alterations and additions, including but not limited to, circuit modifications and the addition of items such as auxiliary audio and/or video output connectors, might alter the safety characteristics of this receiver and create a hazard to the user. Any design alterations or additions may void the manufacturer's warranty and may make you, the servicer, responsible for personal injury or property damage resulting therefrom.

4. **Picture Tube Implosion Protection Warning** — The picture tube in this receiver employs integral implosion protection. For continued implosion protection, replace the picture tube only with one of the same type number. Do not remove, install, or otherwise handle the picture tube in any manner without first putting on shatterproof goggles equipped with side shields. People not so equipped must be kept safely away while picture tubes are handled. Keep the picture tube away from your body. Do not handle the picture tube by its neck.

5. **Hot Chassis Warning** — **a.** Some TV receiver chassis are electrically connected directly to one conductor of the AC power cord and may be safely serviced without an isolation transformer only if the AC power plug is inserted so that the chassis is connected to the ground side of the AC power source. To confirm that the AC power plug is inserted correctly, with an AC voltmeter measure between the chassis and a known earth ground. If a voltage reading in excess of 1.0V is obtained, remove and reinsert the AC power plug in the opposite polarity and again measure the voltage potential between the chassis and a known earth ground. **b.** Some TV receiver chassis normally have 85V AC (RMS) between chassis and earth ground regardless of the AC plug polarity. These chassis can be safely serviced only with an isolation transformer inserted in the power line between the receiver and the AC power source, for both personnel and test equipment protection. **c.** Some TV receiver chassis have a secondary ground system in addition to the main chassis ground. This secondary ground system is not isolated from the AC power line. The two ground systems are electrically separated by insulating material that must not be defeated or altered.

6. Observe original lead dress. Take extra care to assure correct lead dress in the following areas: **a.** near sharp edges, **b.** near thermally hot parts — be sure that leads and components do not touch thermally hot parts, **c.** the AC supply, **d.** high voltage and **e.** antenna wiring. Always inspect in all areas for pinched, out-of-plate, or frayed wiring. Do not change spacing between components, and between components and the printed circuit board. Check AC power cord for damage.

7. Components, parts, and/or wiring that appear to have overheated or are otherwise damaged should be replaced with components, parts, or wiring that meet original specifications. Additionally, determine the cause of overheating and/or damage and, if necessary, take corrective action to remove any potential safety hazard.

8. **PRODUCT SAFETY NOTICE** — Many TV electrical and mechanical parts have special safety-related characteristics some of which are often not evident from visual inspection, nor can the protection they give necessarily be obtained by replacing them with components rated for higher voltage, wattage, etc. Parts that have special safety characteristics are identified Hitachi service data by shading on schematics and by a (⚠) in the parts list. Use of a substitute replacement that does not have the same safety characteristics as the recommended replacement part in Hitachi service data parts list might create shock, fire, and/or other hazards. Product safety is under review continuously and new instructions are issued whenever appropriate. For the latest information, always consult the appropriate current Hitachi service literature. A subscription to, or additional copies of Service literature may be obtained at a normal charge from Hitachi.

SERVICING PRECAUTIONS

CAUTION: Before servicing instruments covered by this service data and its supplements and addenda, read and follow the SAFETY PRECAUTIONS on page 19 of this publication.

NOTE: If unforeseen circumstances create conflict between the following servicing precautions and any of the safety precautions on page 19 of this publication, always follow the safety precautions. Remember: Safety First.

General Servicing Precautions

1. Always unplug the instrument AC power cord from the AC power source before:
   a. Removing or reinstalling any component, circuit board, module, or any other instrument assembly.
   b. Disconnecting or reconnecting any instrument electrical plug or other electrical connection.
   c. Connecting a test substitute in parallel with an electrolytic capacitor in the instrument.
   Caution: A wrong part substitution or incorrect polarity installation of electrolytic capacitors may result in an explosion hazard.
   d. Discharging the picture tube anode.
2. Test high voltage only by measuring it with an appropriate high voltage meter or other voltage measuring device (DVM, FETVOM, etc.) equipped with a suitable high voltage probe. Do not test high voltage by "drawing an arc." The H.V. Distribution Box has an internal 400MΩ resistor (bleeder resistor) connected from the high voltage to ground. After power is removed from the instrument the high voltage will discharge through the high voltage bleeder resistor. If the tubes have high voltage after power is removed, then the bleeder resistor is defective or the bleeder ground is disconnected.
3. Discharge the picture tube's anode at any of the R, G, or B outputs on the High Voltage distribution box only by (a) first connecting one end of an insulated clip lead to the degaussing or kine aquadag grounding system shield at the point where the picture tube socket ground lead is connected, and then (b) touch the other end of the insulated clip lead to the picture tube high voltage distribution box R, G, or B output, using an insulating handle to avoid personal contact with high voltage.
4. Do not spray chemical on or near this instrument or any of its assemblies.
5. Unless specified otherwise in these service data, clean electrical contacts by applying the following mixture to the contacts with a pipe cleaner, cotton-tipped stick or comparable nonabrasive applicator: 10% (by volume) Acetone and 90% (by volume) isopropyl alcohol (90%-99% strength). **Caution:** This is a flammable mixture. Unless specified otherwise in these service data, lubrication of contacts is not required.
6. Do not defeat any plug/socket B+ voltage interlocks with which instruments covered by this service data might be equipped.
7. Do not apply AC power to this instrument and/or any of its electrical assemblies unless all solid-state device heat sinks are correctly installed.
8. Always connect the test instrument ground lead to the appropriate instrument chassis ground before connecting the test instrument positive lead. Always remove the test instrument ground lead last.
9. Use with this instrument only the test fixtures specified in this service data.
   CAUTION: Do not connect the test fixture ground strap to any heatsink in this instrument.

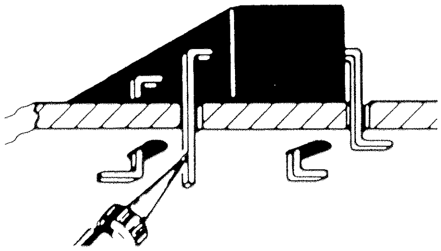
Electrostatically Sensitive (ES) Devices

Some semiconductor (solid state) devices can be damaged easily by static electricity. Such components commonly are called Electrostatically Sensitive (ES) Devices. Examples of typical ES devices are integrated circuits and some field-effect transistors and semiconductor "chip" components. The following techniques should be used to help reduce the incidence of component damage caused by static electricity.

1. Immediately before handling any semiconductor component or semiconductor-equipped assembly, drain off any electrostatic charge on your body by touching a known earth ground. Alternatively, obtain and wear a commercially available discharging wrist strap device, which should be removed for potential shock reasons prior to applying power to the unit under test.
2. After removing an electrical assembly equipped with ES devices, place the assembly on a conductive surface such as aluminum foil, to prevent electrostatic charge buildup or exposure of the assembly.
3. Use only a grounded-tip soldering iron to solder or unsolder ES devices.
4. Use only an anti-static type solder removal device. Some solder removal devices not classified as "anti-static" can generate electrical charges sufficient to damage ES devices.
5. Do not use freon-propelled chemicals. These can generate electrical charges sufficient to damage ES devices.
6. Do not remove a replacement ES device from its protective package until immediately before you are ready to install it. (Most replacement ES devices are packaged with leads electrically shorted together by conductive foam, aluminum foil or comparable conductive material.)
7. Immediately before removing the protective material from the leads of a replacement ES device, touch the protective material to the chassis or circuit assembly into which the device will be installed.
   CAUTION: Be sure no power is applied to the chassis or circuit, and observe all other safety precautions.
8. Minimize bodily motions when handling unpackaged replacement ES devices. (Otherwise harmless motion such as the brushing together of your clothes fabric or the lifting of your foot from a carpeted floor can generate static electricity sufficient to damage an ES device.)

General Soldering Guidelines

1. Use a grounded-tip, low-wattage soldering iron and appropriate tip size and shape that will maintain tip temperature within the range 500°F to 600°F.
2. Use an appropriate gauge of resin-core solder composed of 60 parts tin/40 parts lead.
3. Keep the soldering iron tip clean and well tinned.
4. Thoroughly clean the surfaces to be soldered. Use a small wire-bristle (0.5 inch or 1.25 cm) brush with a metal handle. Do not use freon-propelled spray-on cleaners.
5. Use the following unsoldering technique.
   a. Allow the soldering iron tip to reach normal temperature (500°F to 600°F).
   b. Heat the component lead until the solder melts. Quickly draw away the melted solder with an anti-static, suction-type solder removal device or with solder braid.
   CAUTION: Work quickly to avoid overheating the circuit board printed foil.
6. Use the following soldering technique.
   a. Allow the soldering iron tip to reach normal temperature (500°F to 600°F).
   b. First, hold the soldering iron tip and solder strand against the component lead until the solder melts.
   c. Quickly move the soldering iron tip to the junction of the component lead and the printed circuit foil, and hold it there only until the solder flows onto and around both the component lead and the foil.
   CAUTION: Work quickly to avoid overheating the circuit board printed foil or components.
   d. Closely inspect the solder area and remove any excess or splashed solder with a small wire-bristle brush.



Use Soldering Iron to Pry Leads

IC Removal/Replacement

Some Hitachi unitized chassis circuit boards have slotted holes (oblong) through which the IC leads are inserted and then bent flat against the circuit foil. When holes are the slotted type, the following technique should be used to remove and replace the IC. When working with boards using the familiar round hole, use the standard technique as outlined in paragraphs 5 and 6 above.

Removal

1. Desolder and straighten each IC lead in one operation by gently prying up on the lead with the soldering iron tip as the solder melts.
2. Draw away the melted solder with an anti-static suction-type solder removal device (or with solder braid) before removing the IC.

Replacement

1. Carefully insert the replacement IC in the circuit board.
2. Carefully bend each IC lead against the circuit foil pad and solder it.
3. Clean the soldered areas with a small wire-bristle brush. (It is not necessary to reapply acrylic coating to the areas.)

"Small-signal" Discrete Transistor Removal/Replacement

1. Remove the defective transistor by clipping its leads as close as possible to the component body.
2. Bend into a "U" shape the end of each of three leads remaining on the circuit board.
3. Bend into a "U" shape the replacement transistor leads.
4. Connect the replacement transistor leads to the corresponding leads extending from the circuit board and crimp the "U" with long nose pliers to insure metal to metal contact, then solder each connection.

Power Output Transistor Devices Removal/Replacement

1. Heat and remove all solder from around the transistor leads.
2. Remove the heatsink mounting screw (if so equipped).
3. Carefully remove the transistor from the circuit board.
4. Insert new transistor in circuit board.
5. Solder each transistor lead, and clip off excess lead.
6. Replace heatsink.

Diode Removal/Replacement

1. Remove defective diode by clipping its leads as close as possible to diode body.
2. Bend the two remaining leads perpendicularly to the circuit board.
3. Observing diode polarity, wrap each lead out of the new diode around the corresponding lead on the circuit board.
4. Securely crimp each connection and solder it.
5. Inspect (on the circuit board copper side) the solder joints of the two "original" leads. If they are not shiny, reheat them and, if necessary, apply additional solder.

Fuses and Conventional Resistor Removal/Replacement

1. Clip each fuse or resistor lead at top of circuit board hollow stake.
2. Securely crimp leads of replacement component around stake 1/8 inch from top.
3. Solder the connections.
   CAUTION: Maintain original spacing between the replaced component and adjacent components and the circuit board, to prevent excessive component temperatures.

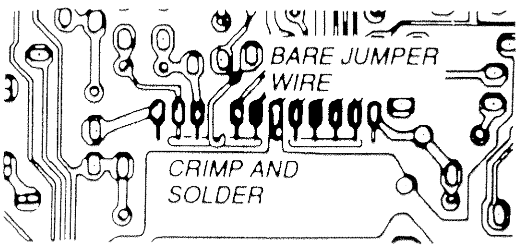
Circuit Board Foil Repair

Excessive heat applied to the copper foil of any printed circuit board will weaken the adhesive that bonds the foil to the circuit board, causing the foil to separate from, or "lift-off," the board. The following guidelines and procedures should be followed whenever this condition is encountered.

In Critical Copper Pattern Areas
High component/copper pattern density and/or special voltage/current characteristics make the spacing and integrity of copper pattern in some circuit board areas more critical than in others. The circuit foil in these areas is designated as Critical Copper Pattern and is identified and illustrated in this service data in the section titled Safety Related Copper Pattern (see table of contents for page number). Because Critical Copper Pattern requires special soldering techniques to ensure the maintenance of reliability and safety standards, contact your Hitachi personnel.

At IC Connections
To repair defective copper pattern at IC connections, use the following procedure to install a jumper wire on the copper pattern side of the circuit board. (Use this technique only on IC connections.)

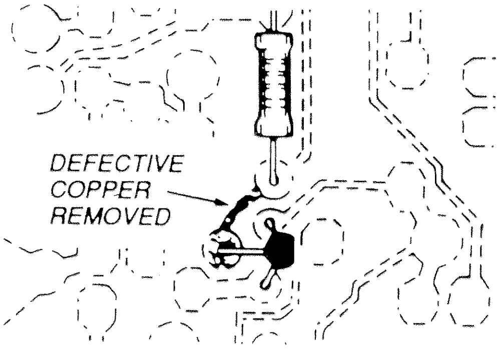
1. Carefully remove the damaged copper pattern with a sharp knife. (Remove only as much copper as absolutely necessary.)
2. Carefully scratch away the solder resist and acrylic coating (if used) from the end of the remaining copper pattern.



Install Jumper Wire and Solder

3. Bend a small "U" in one end of a small-gauge jumper wire and carefully crimp it around the IC pin. Solder the IC connection.
4. Route the jumper wire along the path of the cut-away copper pattern and let it overlap the previously scraped end of the good copper pattern. Solder the overlapped area, and clip off any excess jumper wire.

At Other connections
Use the following technique to repair defective copper pattern at connections other than IC Pins. This technique involves the installation of a jumper wire on the component side of the circuit board.



Insulated Jumper wire

1. Remove the defective copper pattern with a sharp knife. Remove at least 1/4 inch of copper, to ensure that a hazardous condition will not exist if the jumper wire opens.
2. Trace along the copper pattern from both sides of the pattern break and locate the nearest component that is directly connected to the affected copper pattern.
3. Connect insulated 20-gauge jumper wire from the lead of the nearest component on one side of the pattern break to the lead of the nearest component on the other side. Carefully crimp and solder the connections.
   CAUTION: Be sure the insulated jumper wire is dressed so that it does not touch components or sharp edges.

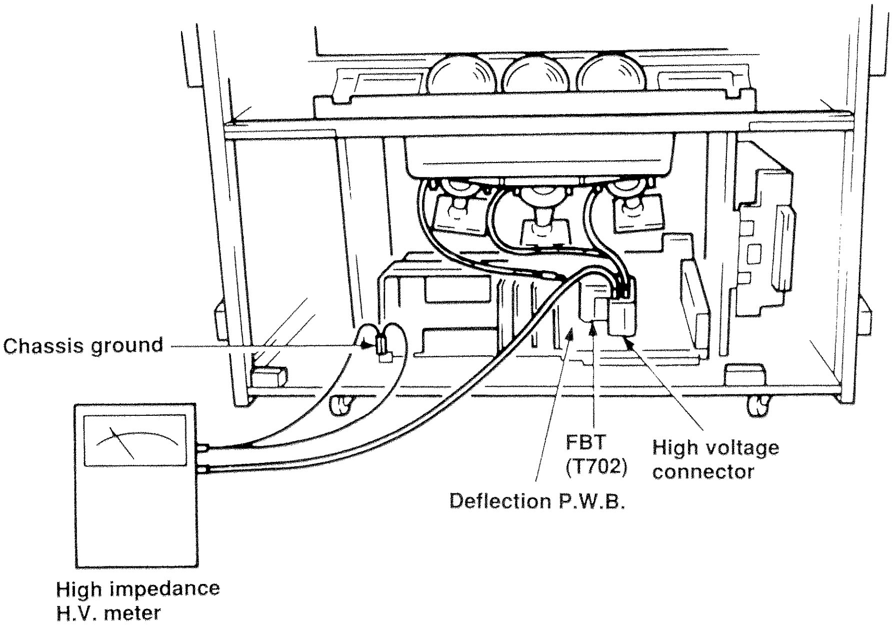
Frequency Synthesis (FS) Tuning Systems

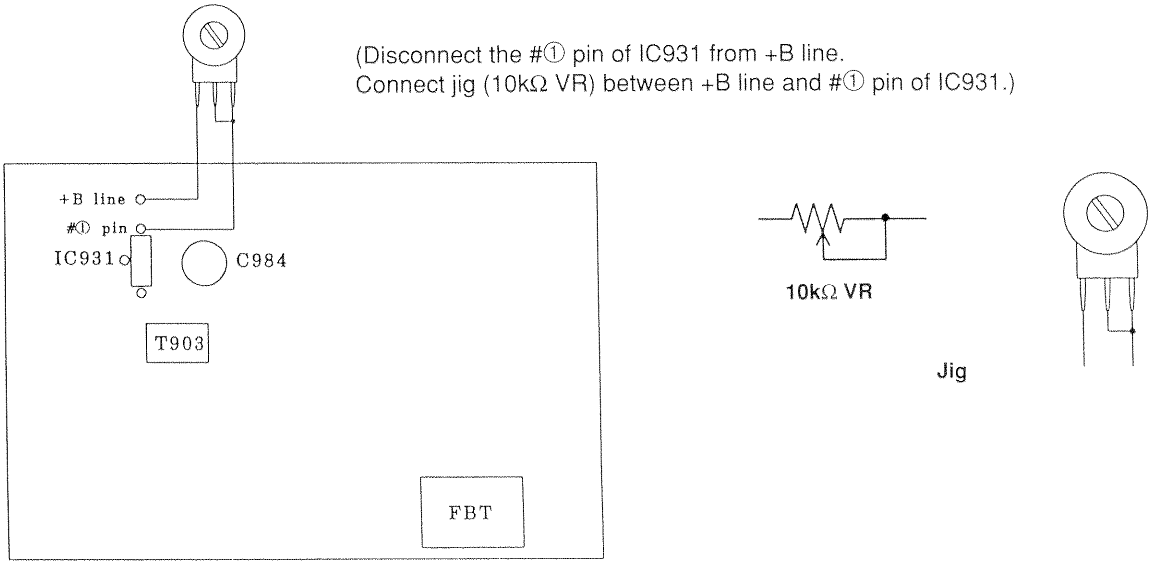
1. Always unplug the instrument AC power cord before disconnecting or reconnecting FS tuning system cables and before removing or reinserting FS tuning system modules.
2. The FS tuner must never be disconnected from the FS tuning control module while power is applied to the instrument.
3. When troubleshooting intermittent problems that might be caused by defective cable connection(s) to the FS tuning system, remove the instrument AC power as soon as the defective connector is found and finish confirming the bad connection with a continuity test. This procedure will reduce the probability of electrical overstress of the FS system semi-conductor components.

TECHNICAL CAUTIONS

High Voltage limiter circuit operation check.

1. Turn off TV and connect jig as shown in Figure 2. Adjust jig fully counter-clockwise for minimum resistance.
2. Set the AC input to 120V AC and turn on TV.
3. Confirm test pattern on CRT is a usable picture, then slowly adjust jig until the picture disappears and TV shuts down.
4. When the limiter circuit is operating properly, High Voltage will be less than 35.5kV at 0.6mA when TV shuts down.
5. Turn off set immediately after checking circuit operation.
6. Unplug set for one minute to reset shutdown circuit. Remove jig and voltmeter.


Chassis ground
FBT (T702)
High voltage connector
Deflection P.W.B.
High impedance H.V. meter


(Disconnect the #① pin of IC931 from +B line.
Connect jig (10kΩ VR) between +B line and #① pin of IC931.)

+B line
#① pin
IC931
C984
T903
FBT
10kΩ VR
Jig

Deflection/Power Supply P.C.B.
Fig. 2

SPECIFICATIONS

Model (AP32 Chassis):	55EX9K 50EX10B 50EX8K 50EX11BV
Cathode-Ray Tube:	80° deflection 7 inch 180CSB22(K)R/180CSB22(K)G/ 180CSB22(K)B
Power Input:	120 volts AC, 60Hz
Power Consumption:	220 watts - Maximum 153 watts - Operating
Antenna Impedance:	75 ohm Unbalanced VHF/UHF/CATV

Receiving Channel:

	CH
VHF	2-13
UHF	14-69
EXT. Mid	(A-2)-(A-1),4^+
CATV Mid	A-I
CATV Super	J-W
CATV Hyper	(W+1)–(W+28)
CATV Ultra	(W+29)–(W+53)

Intermediate Frequency:	Picture I-F Carrier 45.75 MHz Sound I-F Carrier 41.25 MHz Color Sub Carrier 42.17 MHz
Video Input:	1 Voltp-p 75 ohm
Video Output:	1 Voltp-p 75 ohm
Audio Input:	0.4 volt rms, 40 k ohm
Stereo Audio Output:	0.4 volt rms, 1 k ohm
Audio Output Power:	Front — 8 watts rms per channel, 8 ohm impedance. Rear — 4 watts rms per channel, 8 ohm impedance.
Anode Voltage:	30.0 kV (Zero Beam Current)
Brightness:	430 ft-L Nominal - 50EX8K/10B 350 ft-L Nominal - 55EX9K 400 ft-L Nominal - 50EX11BV (Peak White)
Speakers:	2 Woofers - 6 inch (16 cm) round

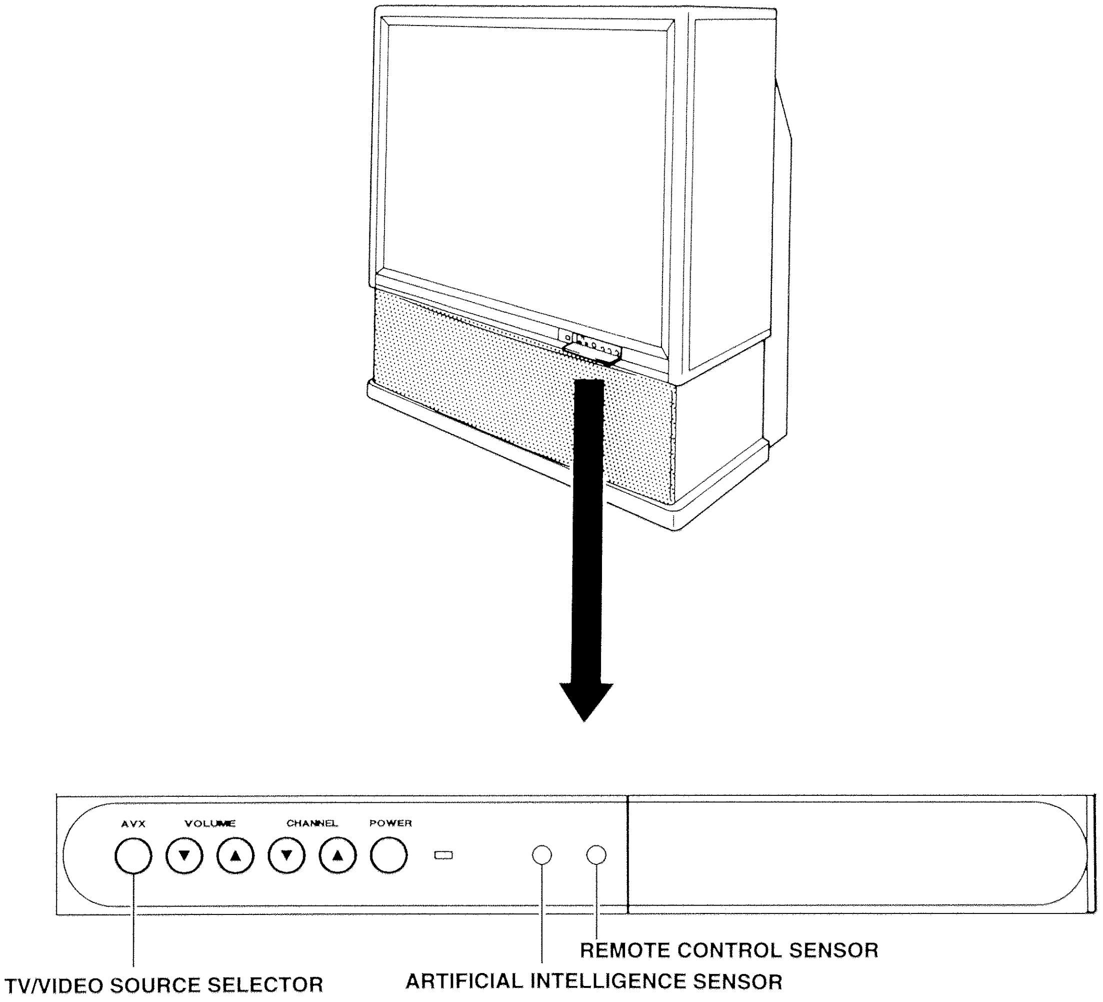
Dimension:	**55EX9K**	**50EX8K/10B**
Height (in.)	55 7/8	50
Width (in.)	50 1/4	41 1/2
Depth (in.)	28 1/8	25
Weight (lbs.)	275	245
	50EX11BV	
Height (in.)	54 1/2	
Width (in.)	41 1/2	
Depth (in.)	25 5/8	
Weight (lbs.)	390	

Circuit Board Assemblies:	CPT (B) P.C.B. CPT (G) P.C.B. CPT (R) P.C.B. Convergence Correction P.C.B. Signal P.C.B. Deflection/Power Supply P.C.B. SP Terminal P.C.B. Control P.C.B. MTS P.C.B. Terminal P.C.B. 2 Line Comb P.C.B.

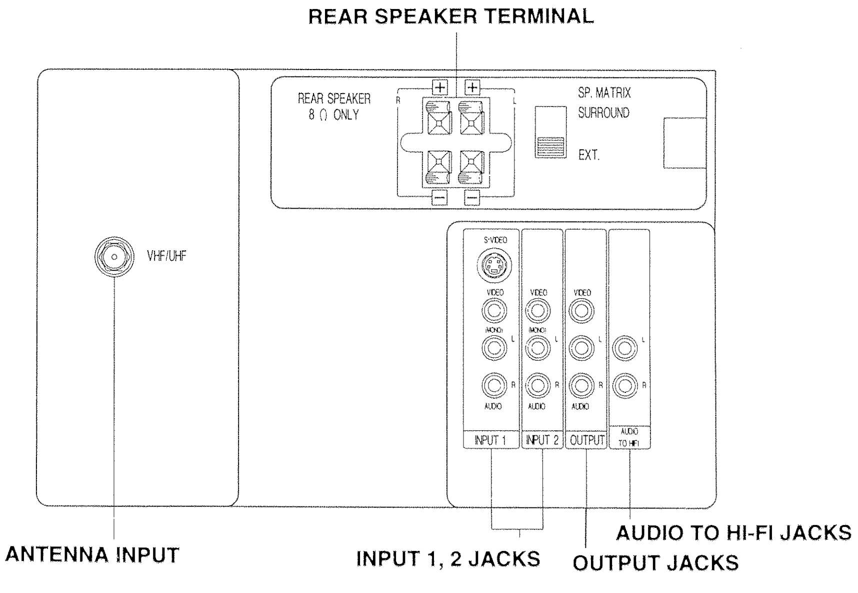
CIRCUIT PROTECTION

Fuse (or Device)	Circuit Protected	Physical Location
F601 1.6A/125V DC	Vertical	Power/Defl. Circuit Board
F901 5A/125V AC	Main Fuse	Power/Defl. Circuit Board
F903 5A/125V DC	Main Fuse	Power/Defl. Circuit Board
F932 4A/125V DC	Vertical	Power/Defl. Circuit Board
F933 3A/125V DC (MINIFUSE)	Convergence	Power/Defl. Circuit Board
F934 3A/125V DC (MINIFUSE)	12V Supply	Power/Defl. Circuit Board
F935 4A/125V DC	11V Supply	Power/Defl. Circuit Board
F936 3A/125V DC (MINIFUSE)	Front Audio Output	Power/Defl. Circuit Board
F937 1.6A/125V DC	130V (+B) Supply	Power/Defl. Circuit Board

GENERAL INFORMATION


AVX
VOLUME
CHANNEL
POWER
REMOTE CONTROL SENSOR
TV/VIDEO SOURCE SELECTOR
ARTIFICIAL INTELLIGENCE SENSOR

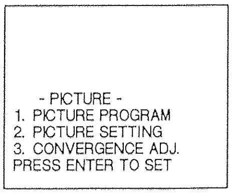
Control Panel
Fig. 3


REAR SPEAKER TERMINAL
REAR SPEAKER
8 Ω ONLY
R
L
SP. MATRIX
SURROUND
EXT.
VHF/UHF
S-VIDEO
VIDEO
(MONO)
AUDIO
INPUT 1
INPUT 2
OUTPUT
AUDIO TO HI-FI
ANTENNA INPUT
INPUT 1, 2 JACKS
AUDIO TO HI-FI JACKS
OUTPUT JACKS

Rear Connections Panel
Fig. 4

ADJUSTING FOR PICTURE AND SOUND FUNCTIONS

Press MENU, 2 ENTER on the remote control to display the -PICTURE- functions.

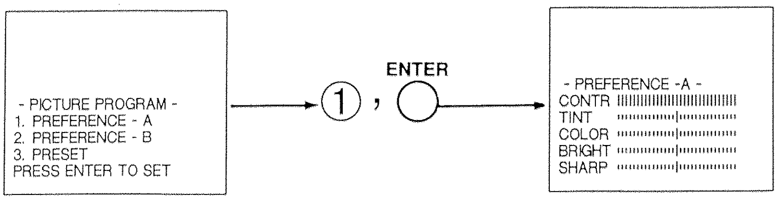


- PICTURE -
1. PICTURE PROGRAM
2. PICTURE SETTING
3. CONVERGENCE ADJ.
PRESS ENTER TO SET

PICTURE PROGRAM is for preferred settings — contrast, color, etc.
PICTURE SETTING is used to improve the picture quality.
CONVERGENCE ADJ. is used to align the TV color picture tubes (red, green, blue) to produce a clear picture.

• PICTURE PROGRAM
There are two sets of preferred settings, PREFERENCE-A, PREFERENCE-B or use the factory PRESET settings.

Press MENU, 2, ENTER, 1, ENTER to select the PICTURE PROGRAM.



- PICTURE PROGRAM -
1. PREFERENCE - A
2. PREFERENCE - B
3. PRESET
PRESS ENTER TO SET

- PREFERENCE -A -
CONTR
TINT
COLOR
BRIGHT
SHARP

Press the CURSOR buttons to select and make adjustments.

CONTRAST — Use this function to change the contrast between black and white levels in the picture. This adjustment will only affect the picture when the PICTURE SETTING AI is OFF.

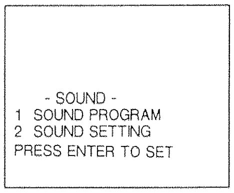
TINT — Use this function to adjust flesh tones so that they appear natural.

COLOR — Use this function to adjust the level of color in the picture.

BRIGHTNESS — Use this function to adjust overall picture brightness.

SHARPNESS — Use this function to adjust the amount of fine detail in the picture. This adjustment will only affect the picture when PICTURE SETTING AI is OFF.

Press MENU, 3 ENTER on the remote control to display the -SOUND- functions.



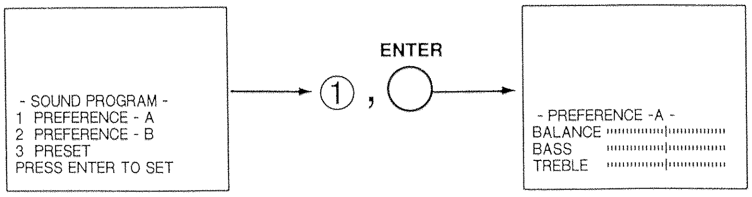
- SOUND -
1 SOUND PROGRAM
2 SOUND SETTING
PRESS ENTER TO SET

SOUND PROGRAM is for preferred settings — balance, bass and treble.
SOUND SETTING is used to improve the sound quality.

• SOUND PROGRAM

There are two sets of preferred settings, PREFERENCE-A, PREFERENCE-B or use the factory PRESET settings.

Press MENU, 3, ENTER, 1, ENTER to select the SOUND PROGRAM.



- SOUND PROGRAM -
1 PREFERENCE - A
2 PREFERENCE - B
3 PRESET
PRESS ENTER TO SET

- PREFERENCE -A -
BALANCE
BASS
TREBLE

Press the CURSOR buttons to select and make adjustments.

BALANCE — This function will control the left, right balance of the TV internal speakers, the AUDIO TO HI-FI output and the surround speakers.

BASS — This function controls the low frequency audio to all speakers.

TREBLE — This function controls the high frequency to all speakers.

SELF CHECK REPAIR CODES

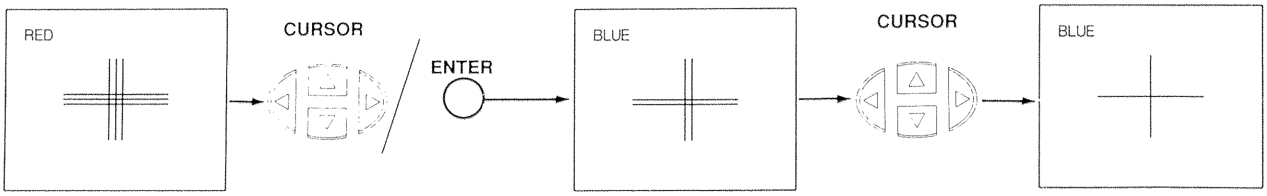
Press the AVX and POWER buttons on the control panel at the same time.

CODE	DETECTION CONTENTS	DETECTION TIME	REMARK
40	Abnormal horizontal deflection	- - -	- - -
41	Flyback Transformer loading on 12V line	- - -	- - -
50	Power Relay off	- - -	Abnormal condition causing relay to turn off
10	Check for PLL lock	Not locked in 2 sec.	During selection time
11	Check for AFC operation	Not finished in 2 sec.	During selection time
60	Check for AC input	At uP reset time	AC input (50/60Hz) not detected at reset time
31	Check IC0001 operation	At uP reset time	Check for out of range operation

Note: Code 10 or 11 may appear if TV is turned on without an antenna source connected.

CONVERGENCE ADJUSTMENT

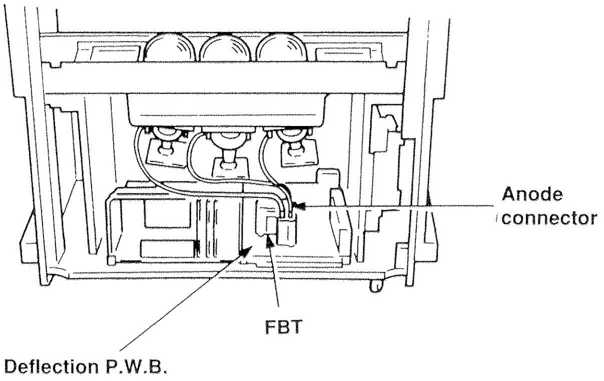
Press MENU, 2, ENTER, 3, ENTER on the remote control to display the CONVERGENCE ADJUSTMENT.



Press the CURSOR ▲, ▼ to move the color displayed up or down.
Press the CURSOR ◀,▶ to move the color displayed left or right.
Press ENTER to change the color.
Press MENU to exit.

CAUTIONS WHEN CONNECTING/DISCONNECTING THE HV CONNECTOR

Perform the following when the HV connector (anode connector) is removed or inserted for CPT replacement, etc.

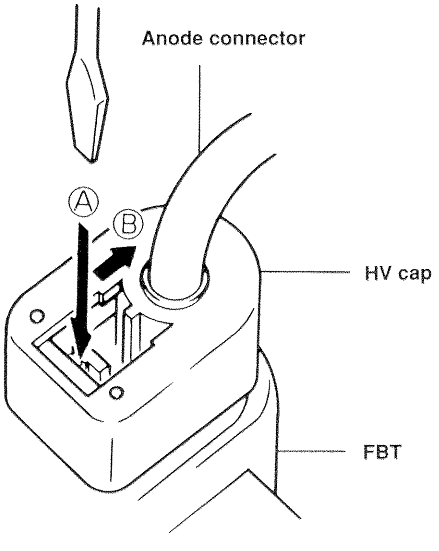


Anode connector
FBT
Deflection P.W.B.

Fig. 5

During Removal

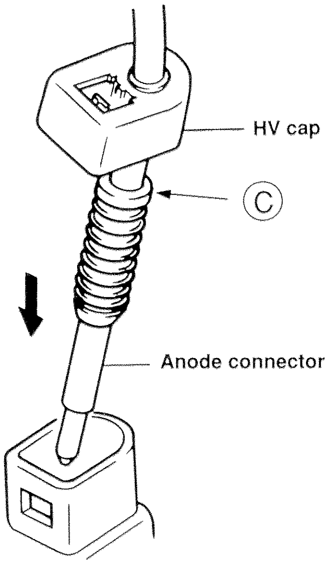
1. Insert a small flat-bladed screwdriver (adjustment screwdriver: 5-7 mm wide and 0.2-0.3 mm thick) into section Ⓐ in Fig. 6 and then push it in the direction of arrow Ⓑ. The lock will release with a click. (The state in Fig. 8 (1) will change to that in Fig. 8 (2).)



Anode connector
Ⓐ
Ⓑ
HV cap
FBT

Fig. 6

2. Remove the HV cap and remove the anode connector (Fig. 7).

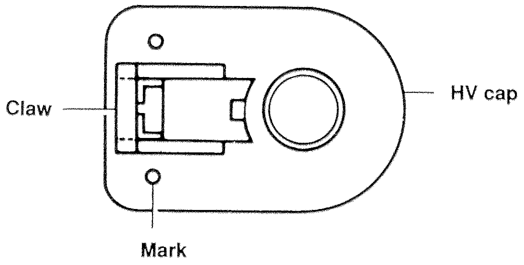


HV cap
Ⓒ
Anode connector

Fig. 7

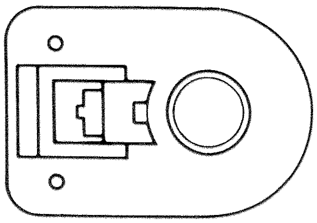
During Insertion

1. Insert the anode connector deep into the FBT (to section Ⓒ in Fig. 7) and then push the HV cap into the FBT until it clicks.
2. Make sure the connector is securely inserted. (Check that the claw is at the mark on the HV cap shown as in Fig. 8 (1).)



Claw
HV cap
Mark

(1) Lock on
(When connector is inserted)



(2) Release
(When connector is removed)

Fig. 8

ADJUSTMENT INSTRUCTION

1. **ASSEMBLED PWB ADJUSTMENT (MTS P.W.B.)** 17

MTS Demodulating Circuit Adjustment

1-1. Stereo VCO Adjustment (R4007) 17
1-2. Filter Adjustment (R4114) 17
1-3. Separation Adjustment (R4009, R4010) 18

2. **CHASSIS ASSEMBLY ADJUSTMENT (SIGNAL P.W.B.)** 19

MTS Demodulating Circuit Adjustment

2-1. MEMORY INITILIZATION 19
2-2. MTS DEMODULATING CIRCUIT ADJUSTMENT 20
  2-2-1. Input level adjustment (R0188) 20
  2-2-2. Separation check 21
  2-2-3. SAP reception check 21
2-3. COMB FILTER ADJUSTMENT 22
2-3-1. COMB FILTER ADJUSTMENT 1 (R5015, L5001) 22
2-3-2. COMB FILTER ADJUSTMENT 2 (R5018, R5022) 22
2-4. HORIZONTAL AFC COARSE ADJUSTMENT 22
2-5. ON-SCREEN DISPLAY POSITION CHECK 23

3. **FINAL ASSEMBLY ADJUSTMENT** 24

3-1. OPTICAL SYSTEM ADJUSTMENT 24
  3-1-1. Focus adjustment 24
3-2. SIGNAL SYSTEM ADJUSTMENT 27
  3-2-1. White balance adjustment 27
  3-2-2. Sub brightness adjustment (R3540) 28
  3-2-3. Sub picture adjustment (R5587, R5624, R5589) 28
  3-2-4. Comb filter adjustment 29
  3-2-5. Shoot balance adjustment (R3566) 29
  3-2-6. Horizontal AFC adjustment 30
3-3. DEFLECTION SYSTEM ADJUSTMENT 31
  3-3-1. Raster inclinations adjustment (Deflection yoke) 31
  3-3-2. Raster position adjustment 32
  3-3-3. Pincushion distortion and keystone distortion correction 33
  3-3-4. Focus adjustment 35
  3-3-5. Blue defocus adjustment 36
  3-3-6. Vertical amplitude adjustment (R622) 37
  3-3-7. Horizontal amplitude adjustment (R763) 37
3-4. CONVERGENCE ADJUSTMENT 38
  3-4-1. Static convergence adjustment 38
  3-4-2. Dynamic convergence adjustment 39

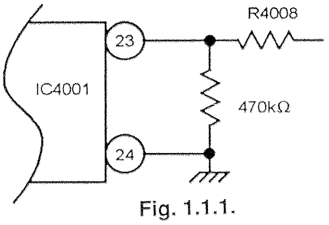
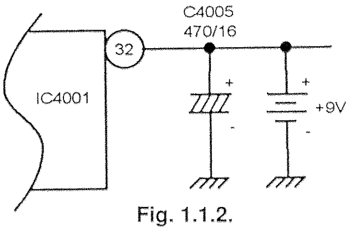
4. **ADJUSTMENT POINT** 43

4-1. CRT (R)(G)(B), CABINET LOCATIONS 43
4-2. MAIN CHASSIS (SIGNAL, POWER/DEFLECTION P.W.B.) 44
4-3. CPT (R)(G)(B), CONTROL P.W.B. 45
4-4. 2 LINE COMB, MTS P.W.B. 46

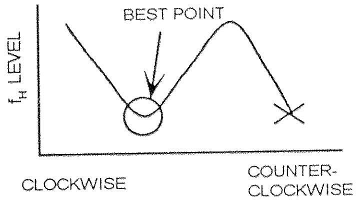
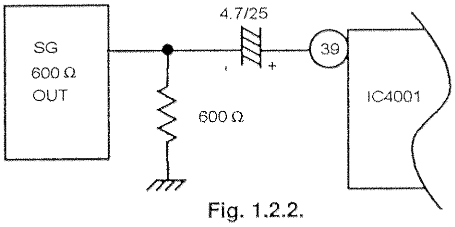
1. ASSEMBLED P.W.B. ADJUSTMENT (MTS P.W.B.)

MTS Demodulating Circuit Adjustment

1.1. Stereo VCO Adjustment (R4007)

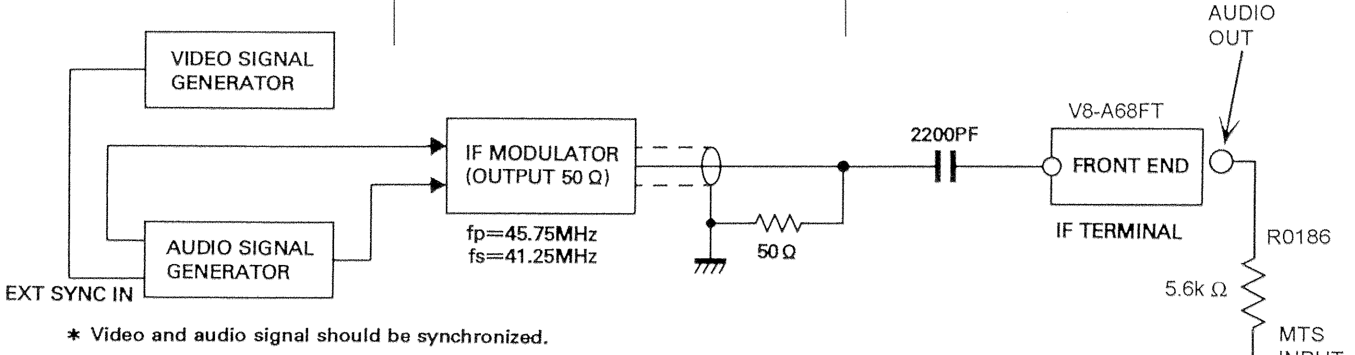
Preparation for adjustment	Adjustment procedure	Remarks/Waveform
(1) Set R4114 fully counterclockwise (2) Set S2-connector pin ① to MTS GND (3) Connect 470kΩ resistor across IC4001 pin ㉓ and ㉔ (4) Connect a frequency counter to IC4001 pin ㊶ . Use 1:1 probe. Probe standard: $R_i \geq 1M\Omega$ $C_i \leq 15pF$ (5) No signal input at IC4001 pin ㊴. (6) Apply +9.0V ±0.1V to IC4001 pin ㉜.	(1) Adjust R4007 to 15.73kHz ±0.01kHz. (2) Remove 470kΩ resistor after adjustment.	 Fig. 1.1.1.  Fig. 1.1.2.

1.2. Filter Adjustment (R4114)

Preparation for adjustment	Adjustment procedure	Remarks/Waveform
(1) Set R4114 fully counterclockwise (2) Apply signal to IC4001 pin ㊴. Sound Generator output impedance = 600Ω f = 15.73kHz Sinusoidal V = 100Vrms (3) Connect oscilloscope to IC4001 pin ㉟. (4) Apply +9.0V ±0.1V to IC4001 pin ㉜.	(1) Adjust R4114 so that the waveform at pin ㉟ is minimum as shown.	 Fig. 1.2.1.  Fig. 1.2.2.

1.3. Separation Adjustment (R4009, R4010)

(1) Apply the signal to F/E IF input terminal of the signal P.W.B. using the jig shown below.


VIDEO SIGNAL GENERATOR
AUDIO SIGNAL GENERATOR
EXT SYNC IN
IF MODULATOR (OUTPUT 50 Ω)
fp=45.75MHz
fs=41.25MHz
50 Ω
2200PF
V8-A68FT
FRONT END
IF TERMINAL
AUDIO OUT
R0186
5.6k Ω

* Video and audio signal should be synchronized.

Fig. 1-3-1

(2) Connect oscilloscope to IC4001 pin④.
(3) Apply +9V±0.1V to IC4001 pin ㉜.
(4) Set "SURROUND" OSD to "OFF" and "MTS" mode to "STEREO."

IF modulator output signal waveform

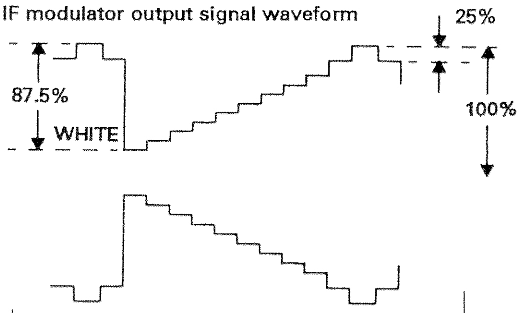
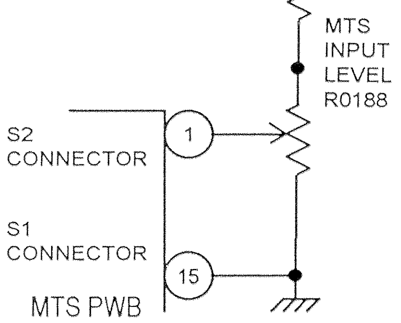

87.5%
WHITE
25%
100%

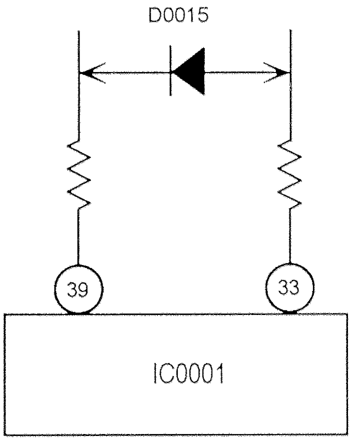
Fig. 1-3-2


MTS INPUT LEVEL R0188
S2 CONNECTOR
1
S1 CONNECTOR
15
MTS PWB

Preparation for adjustment	Adjustment procedure	Remarks/Waveform
IF modulator output level and P/S P=106±3dB μ (50Ω termination) S LEVEL: –3dB with respect to P S/N ratio of the F/E video output should be 45dB or less at this time. Sound input signals • Noise reduction encoder: ON • Stereo signal: ① R=0 (L only), 300 Hz, 30% modulation (Note 2) ② R=0 (L only), 3 KHz, 30% modulation • Monaural signal: ③ Monaural, 400Hz, 100% modulation • Sap signal: ④ Sap, 30% modulation (Note 2)	(1) Select the audio input signal ③ and adjust R0188 so that the reading of the AC voltmeter Vo=150mVrms ±5mVrms. (Refer to Chassis Assembly Adjustment, Input level adjustment 2.2.1 (R0188). (2) Select sound input signal ① and adjust R4009 for 300Hz minimum. (3) Select sound input signal ② and adjust R4010 for 3kHz minimum. (4) Repeat (1) - (3). Adjust within +1dB of minimum point.	• No pilot signal. • Noise reduction is off mode. • Separation point may deviate if input level is not regularly adjusted. (Note 1) The frequency characteristic of the sound modulator must be ±1% from 50Hz to 100kHz (Note 2) Turn off noise reduction (NR), set 30% modulation, then turn (NR) on. Set modulation at audio signal generator output, not IF modulator output.

2. CHASSIS ASSEMBLY ADJUSTMENT (SIGNAL BLOCK)

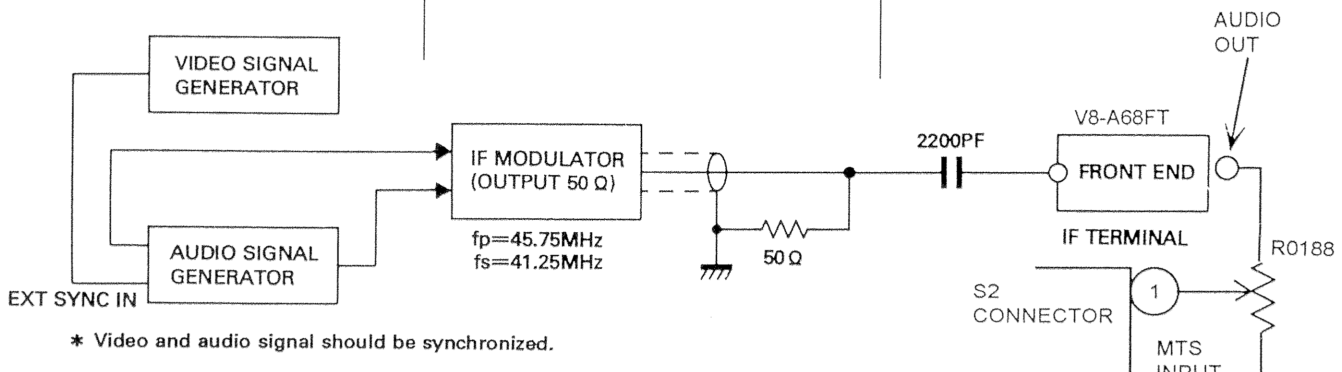
2.1. Memory Initialization

Preparation for adjustment	Adjustment procedure	Remarks/Waveform
(1) Refer to signal printed circuit board to locate D0015 on copper pattern side. (Look for cut-out section of IC0001 shield.)	(1) Connect jig diode D0015 (1SS270) across IC0001 pin ㉝ and ㊴ for one second, then remove. (2) A reset tone, "beep" will be heard from the left speaker and channel "03" will be displayed on the OSD.	The TV will be set to factory shipping conditions.  **Fig. 2.1.1.** Do not unplug set or press any buttons during this operation.

2.2. MTS Demodulating Circuit Adjustment

2.2.1 Input level adjustment (R0188)

Preparation for adjustment	Adjustment procedure	Remarks/Waveform
(1) Apply the signal to F/E IF input terminal of the signal P.W.B. using the jig shown below.		


VIDEO SIGNAL GENERATOR
AUDIO SIGNAL GENERATOR
EXT SYNC IN
IF MODULATOR (OUTPUT 50 Ω)
fp=45.75MHz
fs=41.25MHz
50 Ω
2200PF
V8-A68FT
FRONT END
IF TERMINAL
AUDIO OUT
R0188
S2 CONNECTOR
1
MTS INPUT LEVEL
MTS PWB

* Video and audio signal should be synchronized.

Fig. 2-2-1

IF modulator output signal waveform

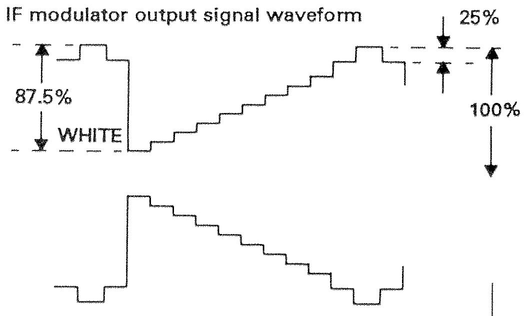
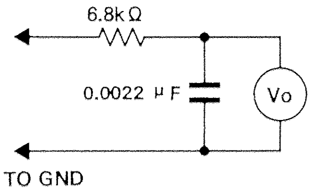

87.5%
WHITE
25%
100%

Fig. 2-2-2

IF modulator output level and P/S P=106±3dB μ (50Ω termination) S LEVEL: –3dB with respect to P S/N ratio of the F/E video output should be 45dB or less at this time. Audio modulation contents • Noise reduction encoder: ON • Stereo signal: ① R=0 (L only), 300 Hz, 30% modulation (Note 2) ② R=0 (L only), 3 KHz, 30% modulation • Monaural signal: ③ Monaural, 400Hz, 100% modulation • Sap signal: ④ Sap, 30% modulation (Note 2)	(1) Select the audio input signal③ and adjust R0188 so that the reading of the AC voltmeter Vo=150mVrms ±5mVrms.	• No pilot signal. • Noise reduction is off mode. (Note 2) Turn off noise reduction (NR), set 30% modulation, then turn (NR) on. Set modulation at audio signal generator output, not IF modulator output.

Preparation for adjustment	Adjustment procedure	Remarks/Waveform
(2) Connect the AC voltmeter (Vo) to pin ㊴ of IC4001 via the jig shown below.  Fig. 2-2-3 (Use the VP950C AC voltmeter made by Matsusita or equivalent.) (3) Apply the D.C. +9V±0.1V to IC4001 pin ㉜. (4) Connect the D.C. +9V±0.1V. (F/E: +B.)		

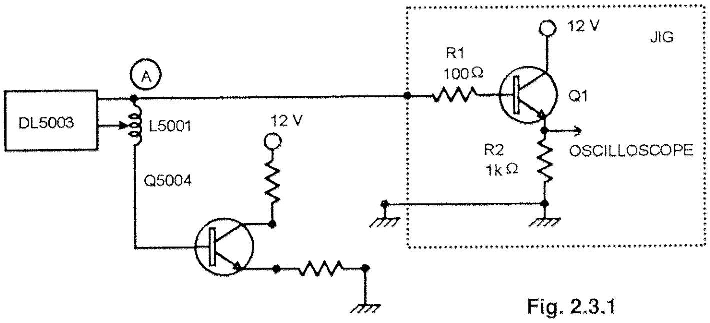
2.2.2. Separation check

Preparation for adjustment	Adjustment procedure	Remarks/Waveform
(1) Connect the same jig as that input level adjustment. (Disconnect the AC voltmeter connected to IC4001. (2) Connect the oscilloscope to pin ③ : (L) and pin ④ : (R) of IC4001. (3) Same as in items 2-2-1. (3) and (4). (4) Set the MTS OSD to STEREO.	(1) Select the audio input signal① and check that L/R separation of 300Hz component is 15dB or more. (2) Select the audio input signal② and check that L/R separation of 3kHz component is 15dB or more. (R<L)	When the audio input signal①/② is received, "STEREO" should be displayed on the screen. (Note 1) Use an audio modulator with frequency characteristics of 50Hz to 100kHz ±1%.

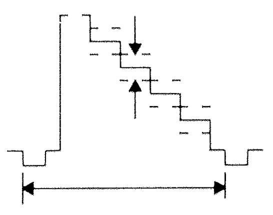
2.2.3. SAP reception check

Preparation for adjustment	Adjustment procedure	Remarks/Waveform
(1) Same as in items 2-2-2 (1) ~ (4). (2) Set the MTS mode to SAP.	(1) Select the audio input signal①. The output level at this time is represented by VST. (2) Select the audio input signal④. Check that the output level at this time is almost the same as VST. ("SAP" should be displayed at this time.)	(Note 2) Turn the noise reduction encoder (NR) off and set to 30% modulation and then turn the NR on. Set the modulation using the output from the low frequency signal generator and leave the audio modulation VR of the IF modulator as it is.

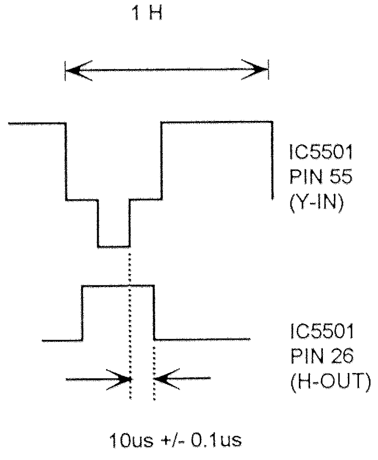
2.3.1 Comb filter adjustment 1 (R5015, L5001)

Preparation for adjustment	Adjustment procedure	Remarks/Waveform
(1) Receive the color bar signal at the regular tuning point. (2) Connect the jig as shown to point Ⓐ (DL5003 output). (3) Observe emitter waveform of Q1. (4) Set BRIGHTNESS-center CONTRAST-maximum NOTCH-OFF	(1) Turn R5015 so that chrominance signal level is minimum. (2) Turn L5001 so that chrominance signal level is minimum. (3) Again adjust R5015 so that chrominance signal level is minimum.	(1) Use a 10:1 probe. (2) Oscilloscope range 20mV/div. (3) Residual chroma signal is 20mVp-p or less. (4) Keep jig leads short to prevent signal deterioration and oscillations.  A DL5003 L5001 12 V Q5004 12 V JIG R1 100Ω Q1 R2 1kΩ OSCILLOSCOPE Fig. 2.3.1

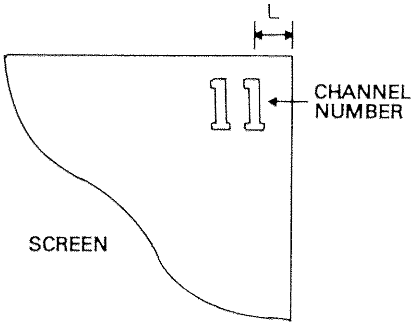
2.3.2 Comb filter adjustment 2 (R5018, R5022)

Preparation for adjustment	Adjustment procedure	Remarks/Waveform
(1) Receive the color bar signal at the regular tuning point. (2) Connect the oscilloscope to the CX connector pin ④.	(1) Adjust R5018 so chroma level is minimum. (2) Adjust R5022 so chroma level is minimum. (3) Readjust R5018 so chroma level is minimum.  Fig. 2.3.2	• Use a 10:1 probe. • Use an oscilloscope with a 50mV/div resolution. • Residual chroma is 30mVp-p or less.

2.4. Horizontal coarse AFC adjustment

Preparation for adjustment	Adjustment procedure	Remarks/Waveform
(1) Receive the reverse cross-hatch pattern signal. (Cross-hatch lines are black.) (2) Connect the oscilloscope to IC5501 pin (55) (Y-In) and pin (26) (Horizontal pulse out).	(1) Adjust R5564 (AFC) for 10µs delay between pin (55) and (26).	 1 H IC5501 PIN 55 (Y-IN) IC5501 PIN 26 (H-OUT) 10us +/- 0.1us **Fig. 2-4**

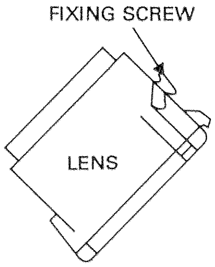
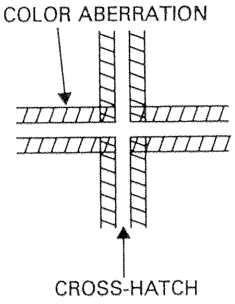
2.5. On-screen display position check

Preparation for adjustment	Adjustment procedure	Remarks/Waveform
(1) Receive the TV broadcast signal. (2) Press the RECALL button of the remote control transmitter to display the channel number.	(1) Check that the right end of the displayed number is at the position shown below.  **Fig. 2-5**	L = 120 ± 10 mm - 50" screen L = 150 ± 10 mm - 55" screen

3. FINAL ASSEMBLY ADJUSTMENT

3.1. OPTICAL SYSTEM ADJUSTMENT

3.1.1. Focus adjustment

Preparation for adjustment	Adjustment procedure	Remarks/Waveform
(1) The set can face in any direction, west, east, north or south. (2) Receive the cross-hatch pattern signal. CONTRAST: MAXIMUM BRIGHTNESS: CENTER (3) The electrical focus adjustment should have been completed. (4) The centering DY inclination should have been adjusted.	(1) Loosen the fixing screw on the lens cylinder so that the lens cylinder can be turned. (Be careful not to loosen too much. If it is loosened too much, rattling when tightening becomes greater and the focus may drift.) After completing steps (5), (6) and (7) below, tighten the fixing screws for each lens with a torque of 7 ~ 12kg/cm. (2) Apply covers to 2 of R, G and B lenses, and project a single color on the screen and adjust in sequence. (The adjustment order of R, G and B is only an example.) (3) For each of the R, G and B lenses, observe the color aberration generated on the outer circumference of the cross-hatch bright line at the center section ±3 pitches vertically and horizontally from the center. (4) If the lens adjustment knob is turned clockwise, viewed from the front, the color aberration changes as follows.	(1) Fixing screw  Fig. 3-1-1 (2) Color aberration  Fig. 3-1-2

Preparation for adjustment	Adjustment procedure	Remarks/Waveform
	(5) In case of G lens Set to the point where the chromatic aberration switches from blue to red. If the chromatic aberration appearing all over the screen is not the same, observe the horizontal bright line at the center of the screen and set to the position where red chromatic aberration slightly appears (reference value: 1-3mm) within the cross-hatch pitches specified in Table below. When the red chromatic aberration appearing at both sides of the bright line is not equal, observe the side with larger chromatic aberration when adjusting.	(3) Since the G light is very important for picture quality and performance, pay special attention in its adjustment. Note: Be careful not to touch the lens with your fingers when adjusting.

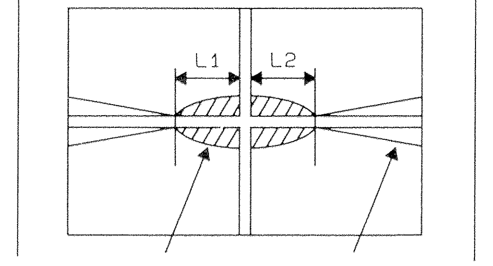


Fig. 3.1.3

Set Size	Pitch between L1 & L2
55"	3.5-4.0 cross-hatch pitches
50"	3.5 cross-hatch pitches

Fig. 3.1.4

Preparation for adjustment	Adjustment procedure	Remarks/Waveform
	(6) In case of R lens Set to the position where the chromatic aberration changes from orange to crimson. As shown below, observe the horizontal bright line at the center and set to the position where the crimson chromatic aberration slightly appears (reference value: 1-3mm) within the cross-hatch pitches specified in Table below. Change the signal and fine-adjust in the same way as the G lens.	(4) Setting to the center between orange and crimson is optimum.

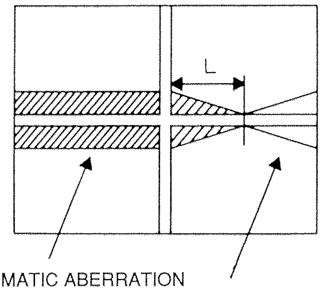
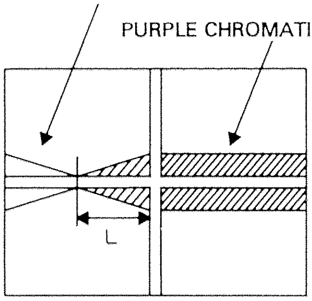

L
ORANGE CHROMATIC ABERRATION
CRIMSON CHROMATIC ABERRATION

Fig. 3.1.5

Set Size	Pitch between L1 & L2
55"	3.5 cross-hatch pitches
50"	3.5 cross-hatch pitches

Preparation for adjustment	Adjustment procedure	Remarks/Waveform
	(7) In case of B lens Set to the position where the chromatic aberration changes from purple to green.	(5) Setting to the center between purple and green is optimum.

GREEN CHROMATIC ABERRATION
PURPLE CHROMATIC ABERRATION
L


3.2. SIGNAL SYSTEM ADJUSTMENT

3.2.1. White balance adjustment

(1) Screen adjustment
(2) High brightness white balance
(3) Low brightness white balance

Screen adjustment VRs	Drive adjustment VRs
Red: R804R Green: R804G Blue: R804B	Red: R813R Green: R813G

Preparation for adjustment	Adjustment procedure	Remarks/Waveform
(1) Start adjustment 20 minutes or more after the power is turned on. (2) The vertical incident illumination on the screen shoule be 20 lux or less. (3) Receive the white raster. (4) Set the drive adjustment VRs (red and green) to their mechanical centers. (5) Turn the screen adjustment VRs (red, green blue) fully counterclockwise. (6) Set the S5502 switch to the bottom as viewed from the front of the signal P.W.B. (Set to SERVICE side.)	(1) Gradually turn the screen adjustment VRs (red, green, blue) clockwise and set them where the red, green and blue slightly bright lines just appear evenly on the screen. (2) Return S5502 to the NORMAL side. (3) Set the brightness and black level controls to minimum and turn the sub brightness adjustment VR (R3540) and set so that the white raster can be seen slightly. (4) Set the brightness and black level controls to maximum. (5) Adjust the high brightness white balance using the drive adjustment VRs (red, green). (6) Set the brightness to 3ft-L amount or less using the brightness and black level controls. (7) Adjust the low brightness white balance using the screen adjustment VRs (red, green, blue). (Visually adjust.) (8) Check that high brightness white balance is obtained. If it does not, return to step (5).	Note: When adjusting the white balance, if the horizontal single raster is to be obtained using S5502, check that the screen adjustment VRs are turned fully counterclockwise. Since the phosphorescent surface of the CRT is likely to be burnt, be careful. White balance: 7500°K +0MPCD Color coordinate: X .... 0.301 Y 0.310

3.2.2. Sub brightness adjustment (R3540)

Preparation for adjustment	Adjustment procedure	Remarks/Waveform
(1) Start adjustment 20 minutes or more after the power is turned on. Receive the color bar signal. (2) Set the contrast and color controls to minimum. (3) Set the brightness to -6 (-3 position shown on the display). (4) The vertical incident illumination on the screen should be 20 lux or less.	(1) Adjust so that the points A1 and A2 sink to black and A3 slightly above it rises using the sub brightness adjustment VR (R3540).	

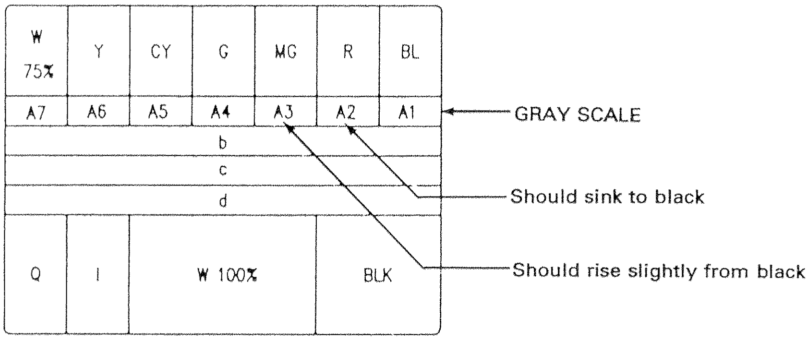
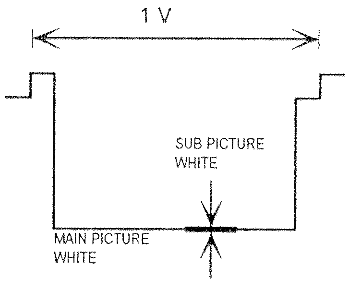
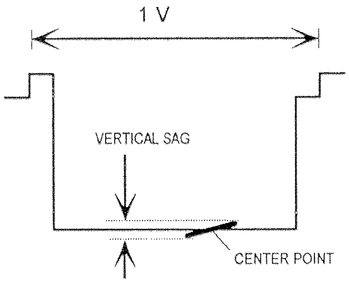

W 75%
Y
CY
G
MG
R
BL
A7
A6
A5
A4
A3
A2
A1
b
c
d
Q
I
W 100%
BLK
GRAY SCALE
Should sink to black
Should rise slightly from black

Fig. 3.2.2

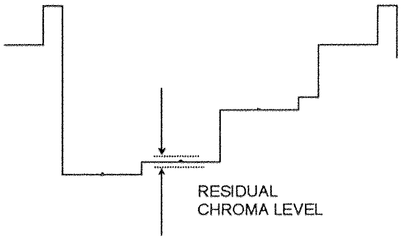
3.2.3. Sub picture adjustment (R5589, R5624, R5587)

Preparation for adjustment	Adjustment procedure	Remarks/Waveform
(1) Start adjustment after power is on for 20 minutes. (2) Use a white raster signal for adjustment. (3) Press "FREEZE" on the remote control to display the sub picture. (4) Set contrast to center, brightness minimum, AI off.	(1) Connect oscilloscope to TP802B and adjust R5589 to match blue level of main and sub pictures. (2) Repeat for TP802G and R5624 for green, TP802R and R5587 for red.	If the sub picture has a signal sag, adjust level at center point.

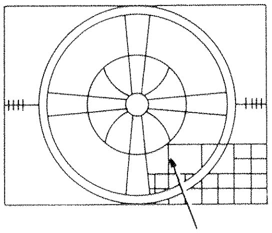

1 V
SUB PICTURE WHITE
MAIN PICTURE WHITE


1 V
VERTICAL SAG
CENTER POINT

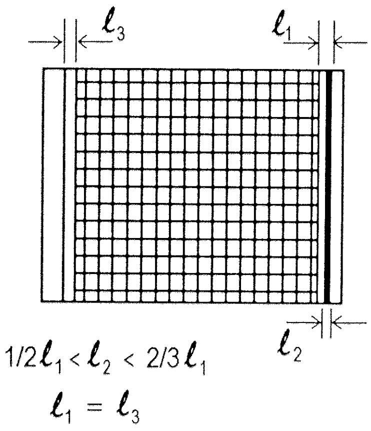
3.2.4 COMB FILTER ADJUSTMENT (R5018, R5022)

Preparation for adjustment		
(1) Receive the color bar signal at the regular tuning point. (2) Connect oscilloscope to the G cathode (TP801G) (3) Set PICTURE to RESET and AI: OFF.	(1) Adjust R5018 so chroma level is minimum. (2) Adjust R5022 so chroma level is minimum. (3) Again adjust R5018 so chroma level is minimum.  RESIDUAL CHROMA LEVEL Fig. 3.2.4	(1) Oscilloscope is 10V/div. (2) Residual chroma level is 6Vp-p or less.

3.2.5 Shoot balance adjustment (R3566)

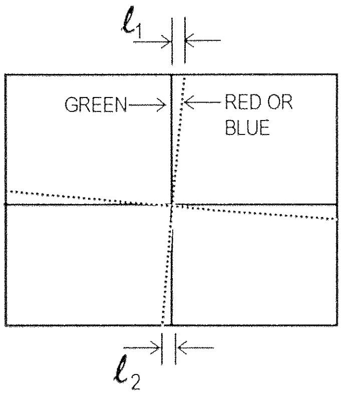
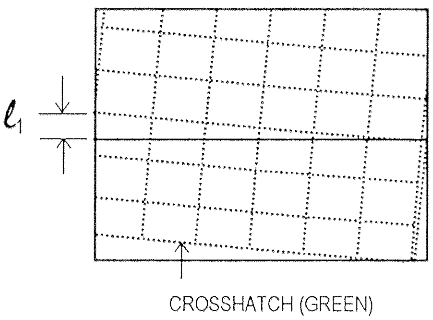
Preparation for adjustment	Adjustment procedure	Remarks/Waveform
(1) Receive the reverse cross-hatch pattern signal. (Cross-hatch lines are black.) (2) Set the video condition to factory reset. (3) Turn the shoot balance adjustment VR (R3566) fully counter-clockwise.	Gradually turn the shoot balance adjustment VR (R3566) clockwise and adjust so that the width of pre-shoot and over-shoot of the vertical line (black) shown below in the circle pattern are balanced. (Visually adjust.)  observe the vertical line to adjust Fig. 3-2-5	Directly observe the screen by eye without using a mirror.

3.2.6. Horizontal AFC adjustment

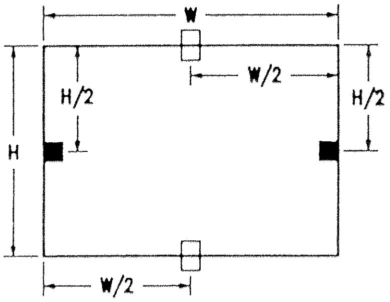
Preparation for Adjustment	Adjustment procedure	Remarks/Waveform
(1) Receive the reverse cross-hatch signal (cross-hatch lines are black). (2) Set CONTRAST to maximum BRIGHTNESS to center. (3) Lens focus should be completed. (4) Electrical focus should be coarse adjusted. (5) Dynamic convergence should be coarse adjusted. (6) Raster inclination should be completed.	(1) Project only green color. Cover R & B lenses or short 2P mini connectors on CPT P.W.B.'s. (2) Adjust H-size to minimum. R763 fully counterclockwise. (3) Adjust green centering magnet (located on DY) to shift picture left to display edge of raster. (4) Adjust AFC (R5564) so foldover of front porch occurs. Amount of foldover is 1/2 to 2/3 of front porch (ℓ_1).  ℓ_3 ℓ_1 ℓ_2 $1/2\ell_1 < \ell_2 < 2/3\ell_1$ $\ell_1 = \ell_3$	(1) If raster edge cannot be seen, adjust GH-Pin (R2131) fully counterclockwise. (2) Front and back porch of video should be equal. (3) If adjustment is difficult with test pattern, follow adjustment 2-4.

3.3. DEFLECTION SYSTEM ADJUSTMENT

3.3.1. Raster inclination adjustment (Deflection yoke)

Preparation for Adjustment	Adjustment procedure	Remarks/Waveform
(1) The set can face east or west. (2) Input the single cross test signal. (3) CONTRAST: MAX BRIGHTNESS: CENTER (4) The lens focus adjustment should have been completed. (5) The electric focus should have been coarse adjusted. (6) The dynamic convergence should have been coarse adjusted. Set the red horizontal skew (R2109) and blue horizontal skew (R2111) adjustment VRs to the mechanical center of their rotation angles.	(1) Apply covers to the R and B lenses and project only green light. (2) Tuen the G deflection yoke and adjust the vertical raster inclination. (3) Then, remove the cover of R or B lens and project red or blue light and green light together on the screen. (4) Turn the deflection yoke of R or B and set so that the inclination of R or B light with respect to the green light is as shown below on the top and bottom sides. (5) After raster inclination adjustment, fixing screw of DY should be screwed with 12±2 kg•cm torque.  $\ell_1, \ell_2 \leqq$ +/-2 mm Fig. 3-3-2	$\ell_1 \leqq$ +/-2 mm  Fig. 3-3-1

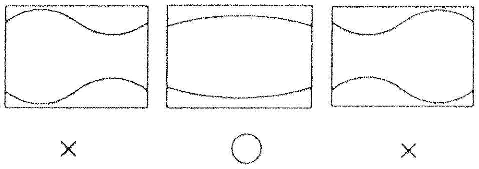
3.3.2. Raster position adjustment

Preparation for Adjustment	Adjustment procedure	Remarks/Waveform
(1) The same as item 3-3-1 (1) ~ (6). (2) The raster inclination adjustment should have been completed. (3) Set red vertical skew (R2110) and blue vertical skew (R2112) to center position. (4) Raster inclination should be adjusted. (5) Horizontal AFC should be adjusted. (6) Apply marking using the tape, etc. at the positions on the screen as shown in Fig. 3-3-2.  Fig. 3-3-2.	(1) Apply covers to the R lens and B lens, and project only green light on the screen. (2) Use the green centering magnet and adjust so that the vertical and horizontal lines of the cross pattern match the position where the markings have been applied. (3) Then remove the cover of R lens or B lens, and project the red or blue light and green light on the screen. (4) Turn the R or B centering magnet to match the color with the green light.	Note: Spec for green centering vertical direction ±3mm horizontal direction ±2.5mm Center of test pattern with respect to geometrical center of screen: horizontal within 30 mm vertical within 20mm Red and Blue centering with respect to green is ±2mm in both horizontal and vertical directions.

3.3.3. Pincushion distortion and keystone distortion correction (Refer to Figs. 3-4-3 and 3-4-4)

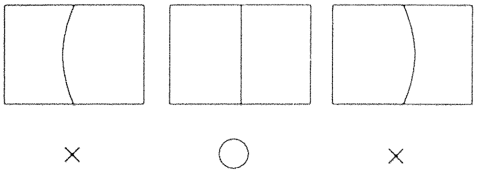
Preparation for Adjustment	Adjustment procedure	Remarks/Waveform
(1) The screen can face any direction, north, south, east and west. (2) Display the cross-hatch pattern signal. (3) The focus adjustment of the G lens should have been completed. (4) The G raster (deflection yoke) inclination should have been adjusted. (5) The vertical amplitude and horizontal amplitude should have been coarse adjusted.	(1) Project only G on the screen using any one of following procedures. (a) Apply covers to the R and B lenses. (b) Short-circuit 2P sub mini connectors plug pins of the R and B CPT P.W.B. (2) Adjust the horizontal line of the G according to the procedure shown in Table 3-1. (3) Adjust the vertical line of the G according to the procedure shown in Table 3-2.	(1) The positions of the adjustment VRs are shown in Fig. 3-4-4. The movement of the bright line corresponding to each VR is shown in Fig. 3-4-3. (2) After this adjustment, check the raster position, vertical amplitude and horizontal amplitude of the G and adjust finally.

Table 3-1. The pincushion and keystone distortion correction of the horizontal green line (refer to Figs. 3-4-3 and 3-4-4).

No.	Adjustment item		Adj. VR	Adjustment details
1	Upper/lower horizontal line	Upper/lower pincushion distortion phase GV-PIN-PHASE	R2372	(1) Set the upper and lower line to the barrel pattern using the GV-PIN (R2132) and GV-U-PIN (R2138). (2) Turn R2372 and adjust so that the curves of the upper and lower lines are balanced on the left and right at the center of the screen.  Fig. 3-3-3-1 (3) At this time, perform the following adjustments together. (a)Remove the inclination of the lower horizontal line using the GV-KEY (R2134). (b)Remove the inclination of the upper horizontal line using the GV-U-KEY (R2136).
2	Lower horizontal line	Upper/lower pincushion distortion GV-PIN	R2132	Correct the bow distortion of the lower horizontal line and make it a straight line.
3		Upper/lower keystone distortion GV-KEY	R2134	Remove the inclination of the lower horizontal line.
4	Upper horizontal line	Upper pincushion distortion GV-U-PIN	R2138	Correct the bow distortion of the upper horizontal line and make it a straight line.
5		Upper keystone distortion GV-U-KEY	R2136	Remove the inclination of the upper horizontal line.

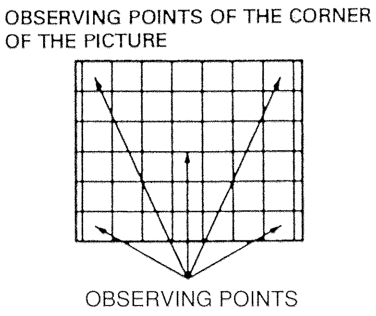
Note 1. Adjustment procedure of the horizontal line (1) Phase (R2372), (2) Lower and then (3) Upper line.
Note 2. Adjust repeatedly as occasion demands.

Table 3-2. The pincushion and keystone distortion correction of the vertical green line (refer to Figs. 3-4-3 and 3-4-4).

No.	Adjustment item		Adj. VR	Adjustment details
1	Center vertical line	Left/right pincushion distortion phase GH-PIN-PHASE	R2183	(1) Approximately correct the bow distortion at both the left and right sides using GH-PIN (R2131) and GH-L-PIN (R2137). (2) Turn R2183 to correct the bow distortion of the center vertical line and to make it a straight line.  **Fig. 3-3-3-2**
2	Right vertical line	Left/right pincushion distortion GH-PIN	R2131	Correct the bow distortion of the right side vertical line and make it a straight line.
3		Left/right keystone distortion GH-KEY	R2133	Remove the inclination of the vertical line on the right side.
4	Left side vertical line	Left pincushion distortion GH-L-PIN	R2137	Correct the bow distortion of the left side vertical line and make it a straiget line.
5		Left keystone distortion GH-L-KEY	R2135	Remove the inclination of the vertical line on the left side.

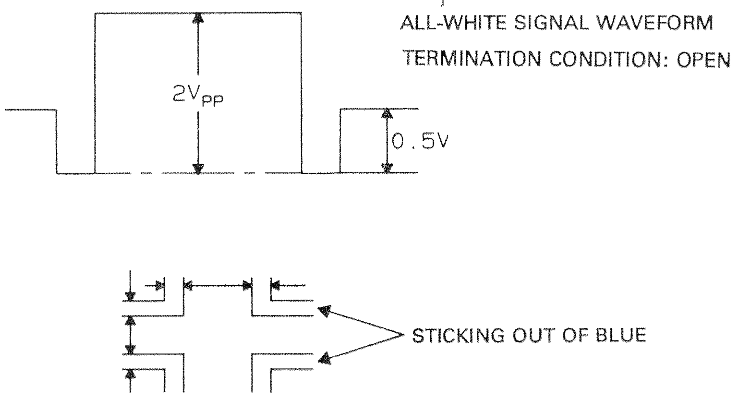
Note 1. Adjustment procedure of the vertical line (1) Phase (R2183), (2) Lines on right and then left side.
Note 2. Adjust repeatedly as occasion demands.

3.3.4 Static focus adjustment

Preparation for Adjustment	Adjustment procedure	Remarks/Waveform
(1) The raster inclination, centering, horizontal/vertical amplitude and optical/electrical focus beam alignment should have been adjusted. (2) The static convergence data should be cleared. (3) Contrast: More than MAX-5 STEP Brightness: Center (Reset point) (4) Receive the cross-hatch pattern signal. (5) Apply covers to the lenses of colors other than the color to be adjusted and project a single color.	(1) Red (R), Green (G) and Blue (B) static focus adjustment. Vary the static focus VR (focus pack CP702) and make the center of the cross-hatch pattern clearest. (2) Observe the corners of the picture and check that the focus does not get conspicuously worse.  OBSERVING POINTS OF THE CORNER OF THE PICTURE OBSERVING POINTS Fig. 3-3-4-4	

3.3.5. Blue defocus adjustment

Preparation for Adjustment	Adjustment procedure	Remarks/Waveform
(1) Optical and electrical focus adjustment should have been completed. (2) The convergence adjustment should have been completed. Coarse-adjustment is acceptable for convergence. (3) Brightness: Max. Other items: Typ.	(1) Input an all-white signal shown below to VIDEO input. (2) Short-circuit 2P sub-mini connectors on the red and green CPT P.W.B.s to display only the blue beam. (3) Turn the B static (Focus Pack) fully clockwise. (4) Measure the brightness at the center of the screen and turn the B static (Focus Pack) counterclockwise to adjust the brightness of blue as shown in Table below. (5) After the adjustment is completed, if blue exceeds the specification, turn and adjust focus so that the sticking out part of blue satisfies the specification.	Cautions Correct the brightness gauge and amplitude of the all-white signal periodically. The aperture angle of the brightness gauge is 1°.



UNEVENNESS SPECIFICATION: ±1cd/m^2

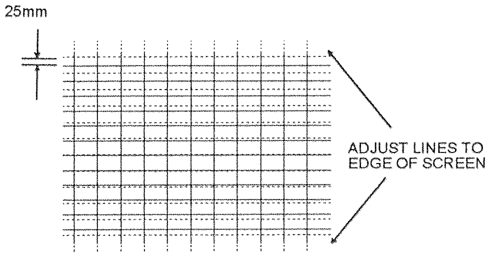
Fig. 3-3-5

Defocus brightness specification

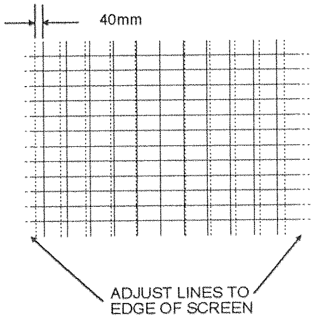
Screen Size	Brightness of Blue
55"	30 cd/m^2
50"	37 cd/m^2

<table>
<tr><th>Preparation for Adjustment</th><th>Adjustment procedure</th><th>Remarks/Waveform</th></tr>
<tr><td></td><td>Defocus sticking out specification
<table>
<tr><th>Screen Size</th><th>Blue sticking out</th></tr>
<tr><td>55"</td><td>2.0 mm</td></tr>
<tr><td>50"</td><td>2.0 mm</td></tr>
</table>
Condition: User controls are set to the initial set positions (for shipment)
Measuring point Screen center</td><td>Use a cross-hatch pattern to check. (Select CONVERGENCE ADJUST from the VIDEO menu then press the "100" key.)</td></tr>
</table>

3.3.6. Vertical amplitude adjustment (R622)

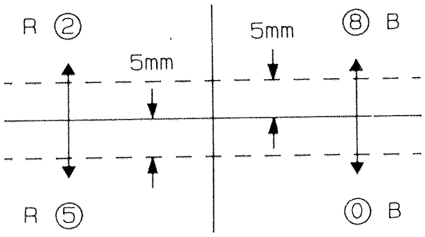
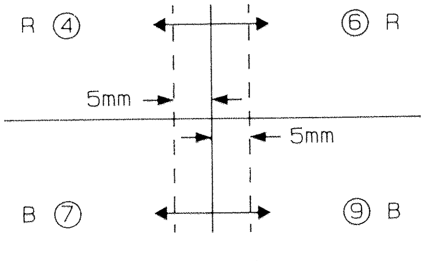
Preparation for Adjustment	Adjustment procedure	Remarks/Waveform
(1) Start adjustment more than 5 minutes after the power is turned on. (2) The pincushion distortion and the horizontal keystone distortion adjustment should have been completed. (3) Receive the crosshatch signal. (4) Set the contrast control to maximum and brightness contol to center. (5) Apply cover to the R and B lenses or short-circuit the 2P sub-mini plug pins to the R and B CPT P.W.B. and project only Green on the screen.	(1) Adjust R622 so that top and bottom edge of crosshatch touch top and bottom edge of screen frame. (2) Note the position of the first horizontal crosshatch line. (3) Increase V size so that the horizontal line moves up 25mm.	 Fig. 3.3.6

3.3.7. Horizontal amplitude adjustment (R635)

Preparation for Adjustment	Adjustment procedure	Remarks/Waveform
(1) The same as items 3-3-6 (1) ~ (5).	(1) Adjust R635 so that left and right edge of crosshatch touch left and right edge of screen frame. (2) Note position of first vertical crosshatch line. (3) Increase H size (R635) so that the vertical line moves to the left 40mm.	 Fig. 3.3.7

3.4. CONVERGENCE ADJUSTMENT

3.4.1. Static convergence adjustment

Preparation for Adjustment	Adjustment procedure	Remarks/Waveform
(1) The screen can face east or west. (2) Display the cross pattern signal or the cross-hatch pattern signal. (3) R, G and B lens focus adjustment and R, G and B raster inclination adjustment should have been completed. (4) The following adjustment for G raster should have been completed. (5) R and B raster position (centering magnet) adjustment should have been completed. (6) The dynamic convergenceshould have been coarse adjusted previously.	(1) Set to the CONVERGENCE mode using the MENU button of the remote control transmitter. (2) Check that the variable range of the static convergence adjustment is obtained as shown below using the cursor buttons of the remote control transmitter. (3) RV, BV  Fig. 3-4-1 RH, BH  Fig. 3-4-2 If the adjustment cannot be done, turn the centering magnets for R and B and re-adjust the R and B raster position.	(1) Refer to page 14 for static convergence adjustment. (2) Static convergence is set to standard mode during memory initialization.

3.4.2. Dynamic convergence adjustment

Preparation for Adjustment	Adjustment procedure	Remarks/Waveform
(1) The screen can face any direction, north, south, east and west. (2) Start adjustment 20 minutes or more after the power switch is turned on. (3) Display the cross-hatch pattern signal. (4) The following adjustments should have been completed for R, G and B. (a) Lens focus (b) Raster (deflection yoke) inclination (c) Raster position (5) The following adjustments should have been completed for the G raster. (a) Pincushion distortion (b) Keystone distortion (c) Vertical amplitude (d) Horizontal amplitude (6) Horizontal AFC adjustment should be completed. (7) Contrast: Max. Brightness: Center (8) Static convergence should be set to standard mode (memory initialization).	(1) R adjustment Match the R with the G following the procedure shown in Tables 3-4-1 and 3-4-2. At the same time, perform the static convergence adjustment of R. (2) B adjustment Match the B with the G following the procedure shown in Tables 3-4-1 and 3-4-2. At the same time, perform the static convergence adjustment of B. (3) Adjust repeatedly so that the amount of misconvergence of all colors is minimized. (a) If convergence of the vertical line at the right end is drifted, match it using R2193 (red) or R2195 (blue). (b) If converence of the vertical line at the left end is drifted, match it using R2194 (red) or R2196 (blue). (4) After adjustment, re-adjust R and B raster position. (5) After the static convergence adjustment and dynamic convergence adjustment are completed, fix the centering magnet (located on the R and B deflection yokes) using white paint.	(1) When adjusting the R, turn off the B using any one of the following procedures as required. (a) short-circuit the 2P subminiature connector plug pins on the B CPT P.W.B. (b) Apply cover to the B lens. (2) When adjusting the B, turn off the R using any one of the following procedures as required. (a) short-circuit the 2P subminiature connector plug pins on the R CPT P.W.B. (b) Apply cover to the R lens. (3) The position of VRs and the movement of the bright lines are shown in Fig. 3-4-3 and Fig. 3-4-4.

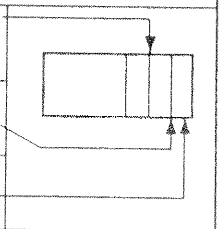
Table 3-4-1. Dynamic convergence adjustment of the horizontal line (RED/BLUE)

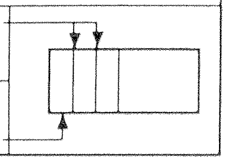
No.	Adjustment item		Adj. VR		Adjustment details
			RED	BLUE	
1	Horizontal center line	Vertical skew V-SKEW	R2110	R2112	Remove the inclination of the horizontal center line.
2		Vertical bow V-BOW	R2114	R2116	Correct the bow distortion of the horizontal center line and make it a straight line.
3	Lower horizontal line	Upper/lower pincushion distortion V-PIN	R2126	R2128	Correct the bow distortion of the lower horizontal line and make it a straight line.
4		Upper/lower keystone distortion V-KEY	R2118	R2120	Remove the inclination of the lower horizontal line.
5	Upper horizontal line	Upper pincushion distortion V-U-PIN	R2141	R2142	Correct the bow distortion of the upper horizontal line and make it a straight line.
6		Upper keystone distortion V-U-KEY	R2122	R2124	Remove the inclination of the upper horizontal line.
7	Upper/lower horizontal line	Vertical size V-SIZE	R2102	R2104	Match the upper/lower horizontal line with the green line by changing the vertical size.
8		Vertical linearity V-LIN	R2106	R2108	Match the upper/lower horizontal line with the green line by changing the linearity.

Note

1. Adjustment procedure of the horizontal lines (1) Center, (2) Lower, (3) Upper and then (4) Upper/Lower.
2. Accurately match the horiziontal center lines (red/blue) with the green line using the centering magnets (item 3-3-2).
3. Including centering magnets, adjust repeatedly as required.

Table 3-4-2. Dynamic convergence adfjustment of the vertical line (RED/BLUE)

No.	Adjustment item		Adj. VR		Adjustment details
			RED	BLUE	
1	Vertical Center line	Horizontal skew H-SKEW	R2109	R2111	Remove the inclination of the vertical center line.
2		Horizontal bow H-BOW	R2113	R2115	Correct the bow distortion of the vertical center line and make it a straight line.
3	Right side vertical line	Left/right pincushion distortion H-PIN	R2125	R2127	Correct the bow distortion of the right side vertical line and make it a straight line.
4		Left/right keystone distortion H-KEY	R2117	R2119	Remove the inclination of the right side vertical line.
5		Horizontal size H-SIZE	R2101	R2103	Match the 3rd vertical line from the right end with the green line. 
6		Horizontal linearity H-LIN	R2105	R2107	Match the 2nd vertical line from the right end with the green line.
7		Right end line linearity H-R-LIN	R2193	R2195	Match the right end line with the green line.

No.	Adjustment item		Adj. VR		Adjustment details
			RED	BLUE	
8	Left vertical line	Left pincushion distortion H-L-PIN	R2129	R2130	Correct the bow distortion of the left side vertical line and make it a straight line.
9		Left keystone distortion H-L-KEY	R2121	R2123	Remove the inclination of the vertical line on the left side.
10		Left horizontal size H-L-SIZE	R2139	R2140	Match the left side vertical line with the green line. 
11		Left end line linearity H-L-LIN	R2194	R2196	Match the left end vertical line with the green line.

Note

1. Adjustment procedure of the vertical lines (1) Center, (2) Right, and then (3) Left line.
2. Accurately match the vertical center lines (red/blue) with the green line using the centering magnets (item 3-3-2).
3. The right end/left end line adjustment VRs shown in Items 7 and 11 of above table, R2193, R2195, R2194 and R2196, should have been set to the mechanical centers previously.
4. Including centering magnets, adjust repeatedly as required.

MOVEMENT OF THE BRIGHT LINE

(This shows the movement of the bright line corresponding to the adjustment VR.)

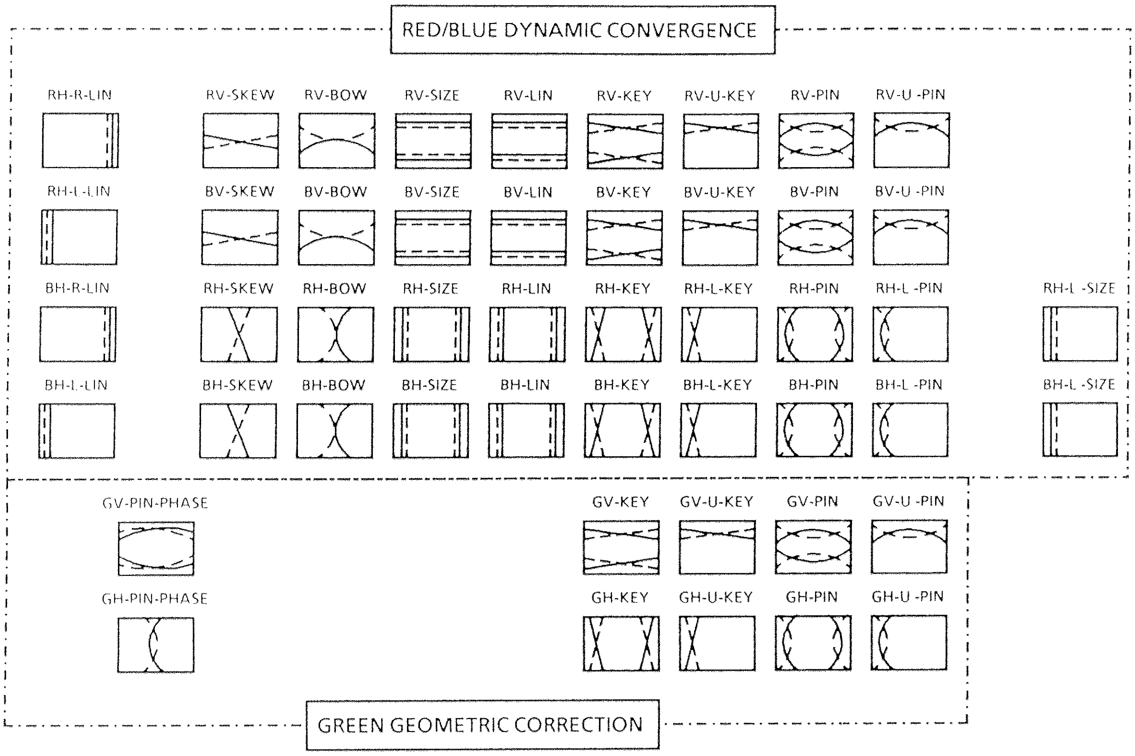

RED/BLUE DYNAMIC CONVERGENCE
RH-R-LIN
RV-SKEW
RV-BOW
RV-SIZE
RV-LIN
RV-KEY
RV-U-KEY
RV-PIN
RV-U -PIN
RH-L-LIN
BV-SKEW
BV-BOW
BV-SIZE
BV-LIN
BV-KEY
BV-U-KEY
BV-PIN
BV-U -PIN
BH-R-LIN
RH-SKEW
RH-BOW
RH-SIZE
RH-LIN
RH-KEY
RH-L-KEY
RH-PIN
RH-L -PIN
RH-L -SIZE
BH-L-LIN
BH-SKEW
BH-BOW
BH-SIZE
BH-LIN
BH-KEY
BH-L-KEY
BH-PIN
BH-L -PIN
BH-L -SIZE
GV-PIN-PHASE
GV-KEY
GV-U-KEY
GV-PIN
GV-U -PIN
GH-PIN-PHASE
GH-KEY
GH-U-KEY
GH-PIN
GH-U -PIN
GREEN GEOMETRIC CORRECTION

Fig. 3-4-3

LAYOUT OF THE ADJUSTMENT VR

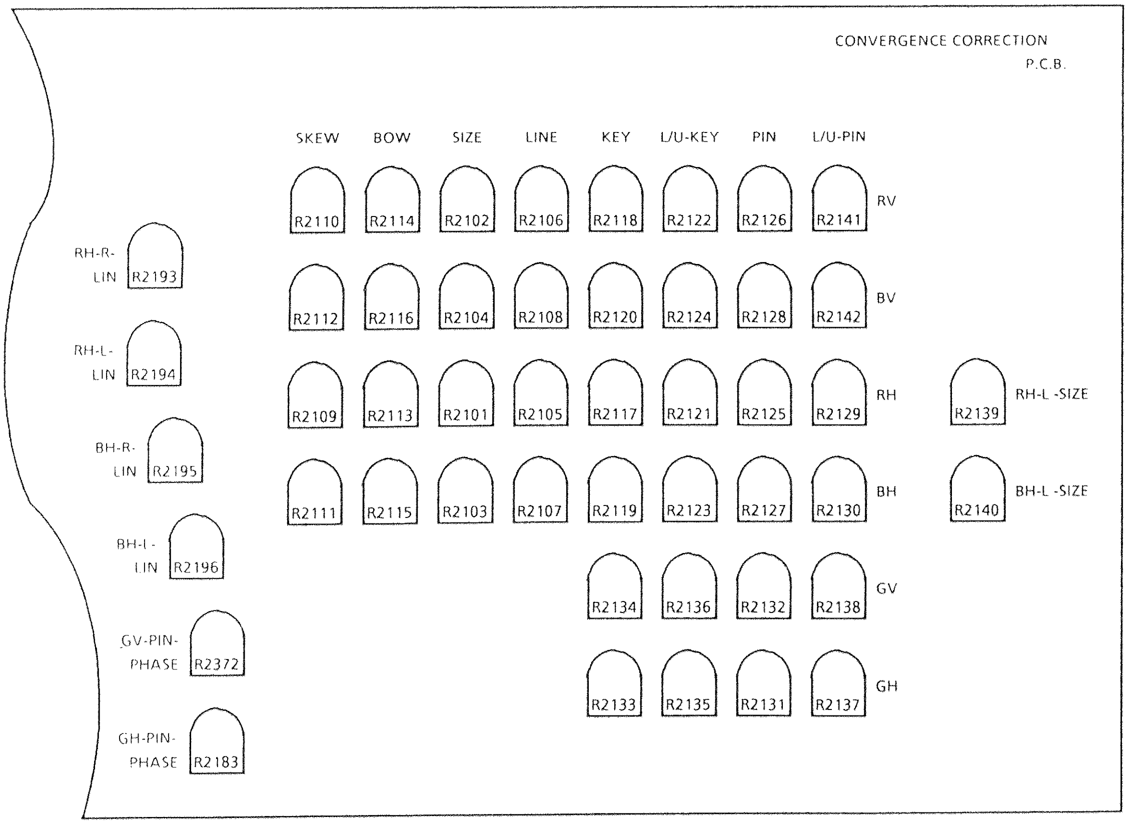
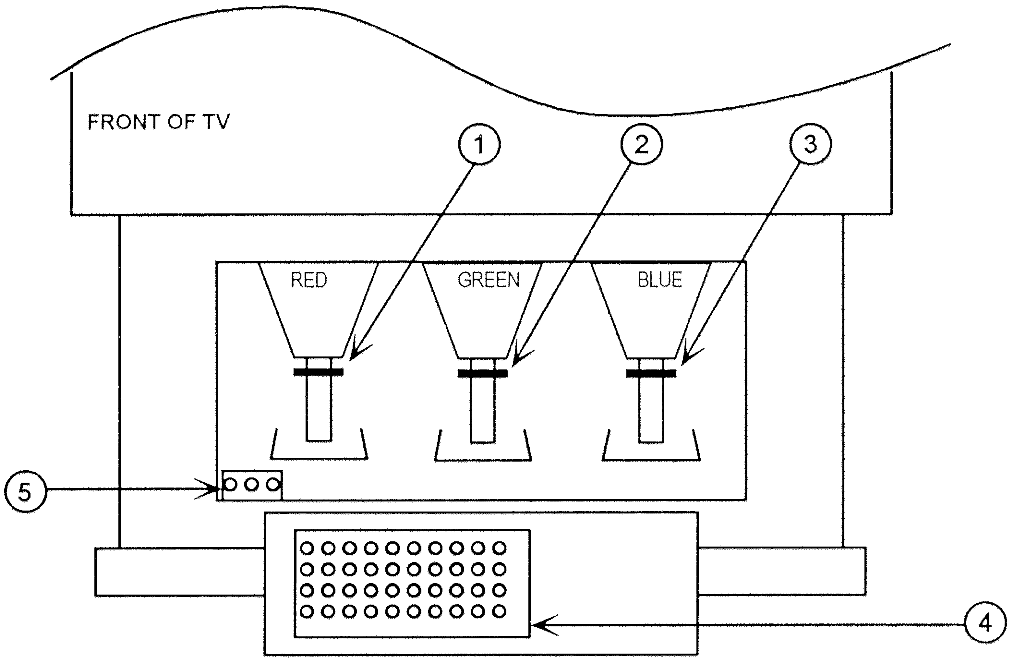

CONVERGENCE CORRECTION
P.C.B.
SKEW
BOW
SIZE
LINE
KEY
L/U-KEY
PIN
L/U-PIN
R2110
R2114
R2102
R2106
R2118
R2122
R2126
R2141
RV
RH-R-
LIN
R2193
R2112
R2116
R2104
R2108
R2120
R2124
R2128
R2142
BV
RH-L-
LIN
R2194
R2109
R2113
R2101
R2105
R2117
R2121
R2125
R2129
RH
R2139
RH-L -SIZE
BH-R-
LIN
R2195
R2111
R2115
R2103
R2107
R2119
R2123
R2127
R2130
BH
R2140
BH-L -SIZE
BH-L-
LIN
R2196
R2134
R2136
R2132
R2138
GV
GV-PIN-
PHASE
R2372
R2133
R2135
R2131
R2137
GH
GH-PIN-
PHASE
R2183

Fig. 3-4-4

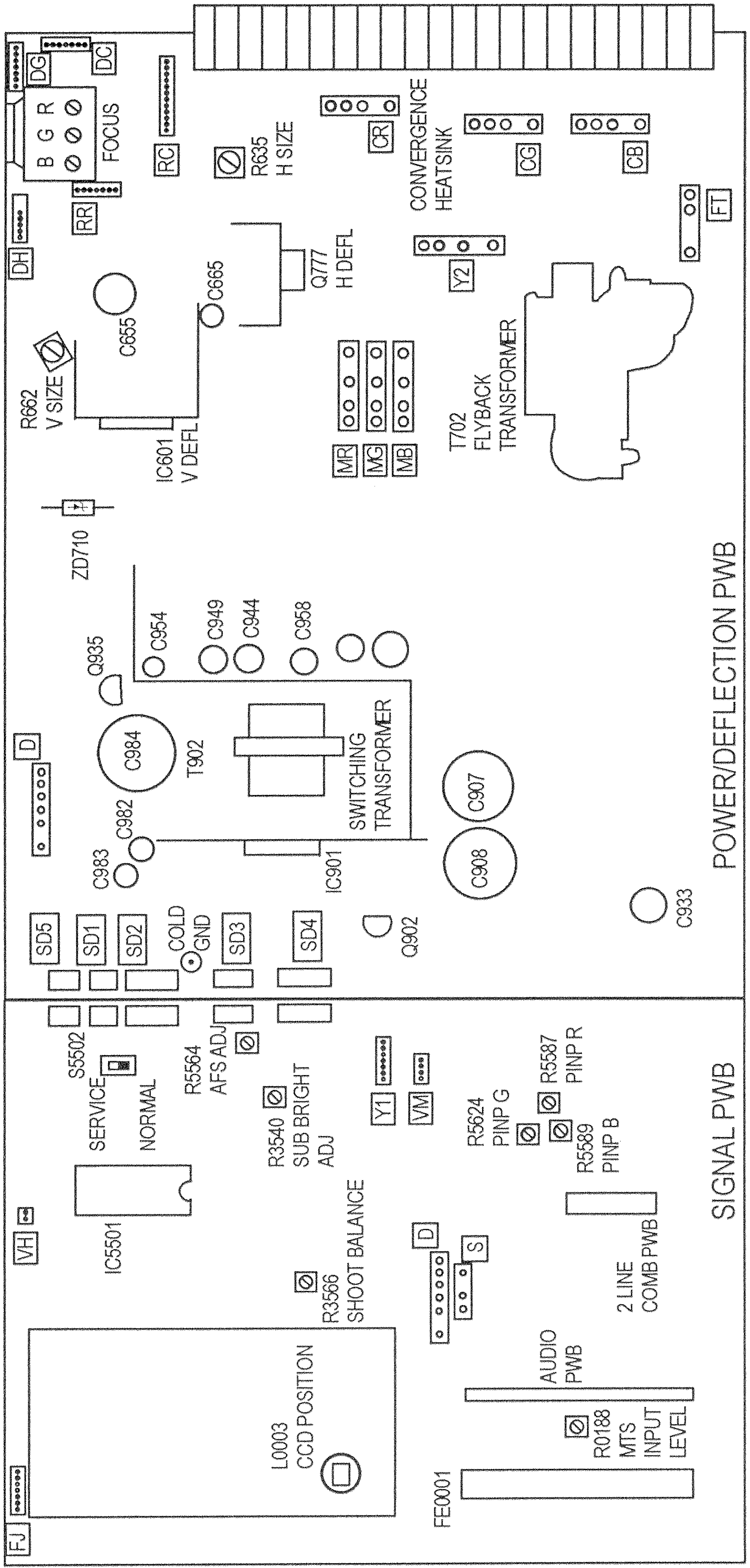
4. ADJUSTMENT POINT

4.1. CRT, cabinet locations

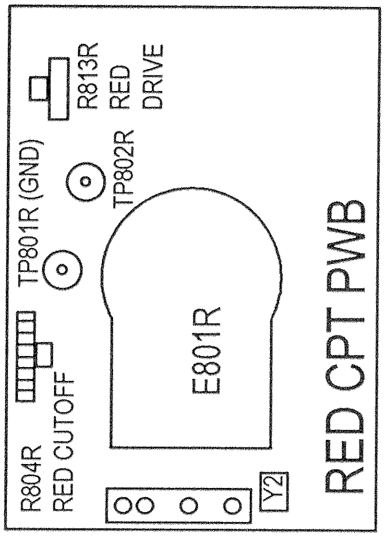

FRONT OF TV
1
2
3
RED
GREEN
BLUE
5
4

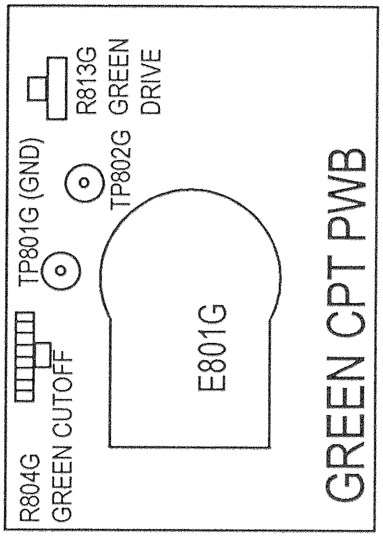
1. CENTERING MAGNET FOR RED PRT
2. CENTERING MAGNET FOR GREEN PRT
3. CENTERING MAGNET FOR BLUE PRT
4. CONVERGENCE CORRECTION PWB
5. FOCUS PACK

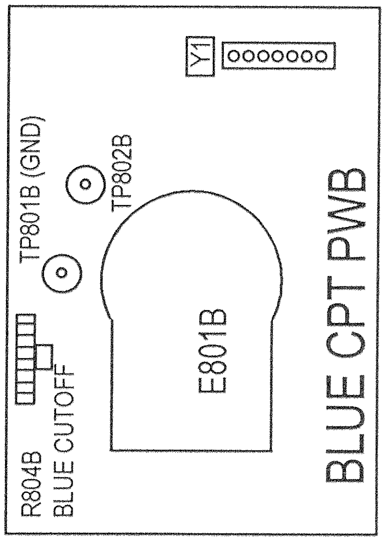
4.2. Signal P.W.B., power/deflection P.W.B. adjustment points

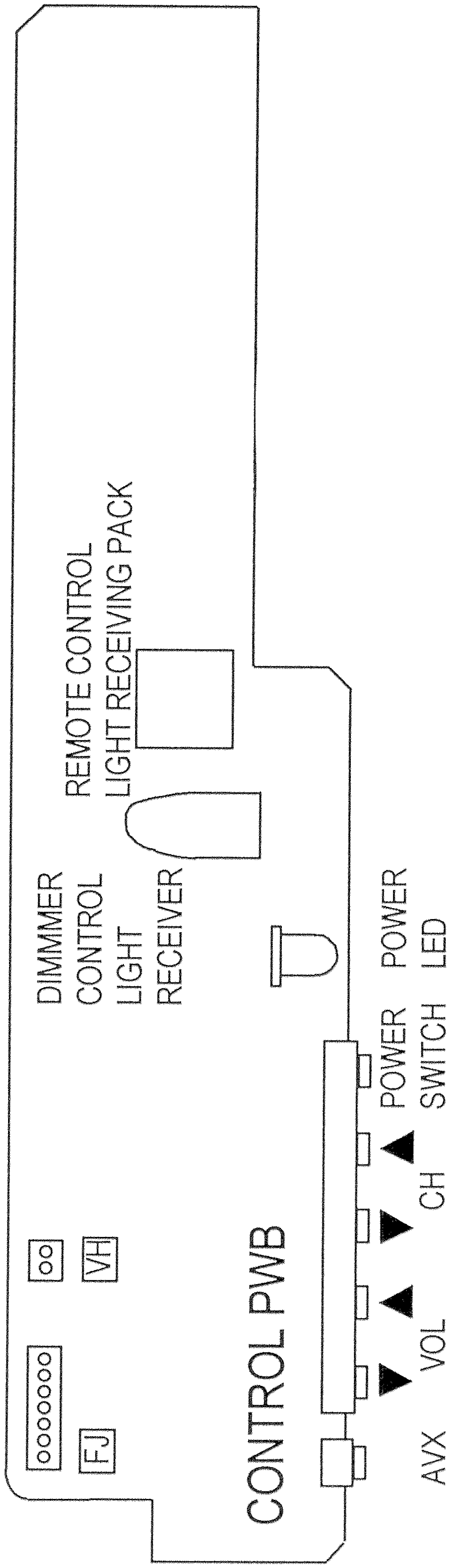

DG
DC
B G R
FOCUS
RC
R635
H SIZE
CR
CONVERGENCE
HEATSINK
CG
CB
RR
DH
C665
Q777
H DEFL
Y2
FT
C655
R662
V SIZE
IC601
V DEFL
MR
MG
MB
T702
FLYBACK
TRANSFORMER
ZD710
Q935
C954
C949
C944
C958
D
C984
T902
SWITCHING
TRANSFORMER
C907
C982
C983
IC901
C908
POWER/DEFLECTION PWB
SD5
SD1
SD2
COLD
GND
SD3
SD4
Q902
C933
S5502
SERVICE
NORMAL
R5564
AFS ADJ
R3540
SUB BRIGHT
ADJ
Y1
VM
R5624
PINP G
R5587
PINP R
R5589
PINP B
SIGNAL PWB
VH
IC5501
D
S
R3566
SHOOT BALANCE
2 LINE
COMB PWB
AUDIO
PWB
L0003
CCD POSITION
R0188
MTS
INPUT
LEVEL
FE0001
FJ

4.3. CPT P.W.B., control P.W.B. adjustment points

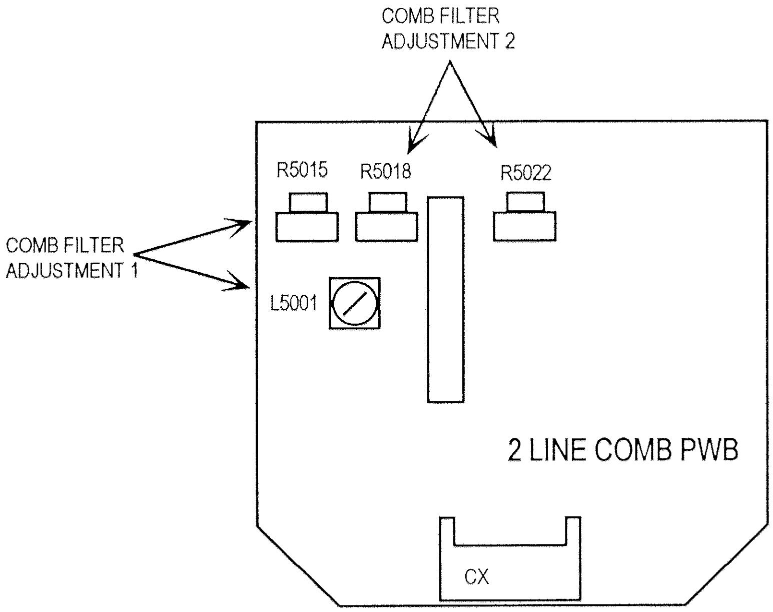

RED CPT PWB
R804R
RED CUTOFF
TP801R (GND)
TP802R
R813R
RED
DRIVE
E801R
Y2

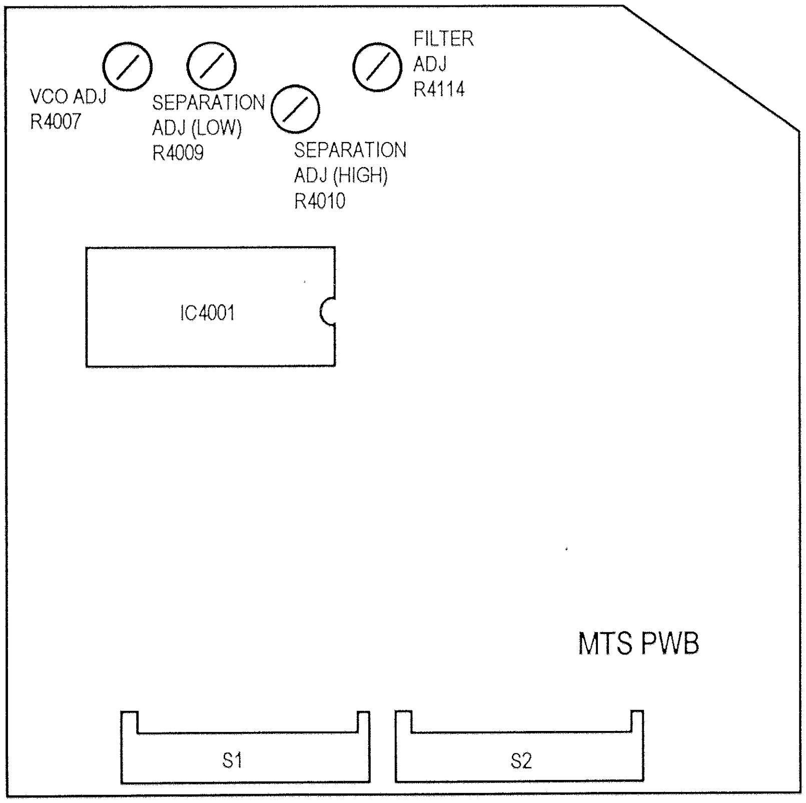

GREEN CPT PWB
R804G
GREEN CUTOFF
TP801G (GND)
TP802G
R813G
GREEN
DRIVE
E801G


BLUE CPT PWB
R804B
BLUE CUTOFF
TP801B (GND)
TP802B
E801B
Y1


CONTROL PWB
REMOTE CONTROL
LIGHT RECEIVING PACK
DIMMMER
CONTROL
LIGHT
RECEIVER
POWER
LED
POWER
SWITCH
CH
VOL
AVX
FJ
VH

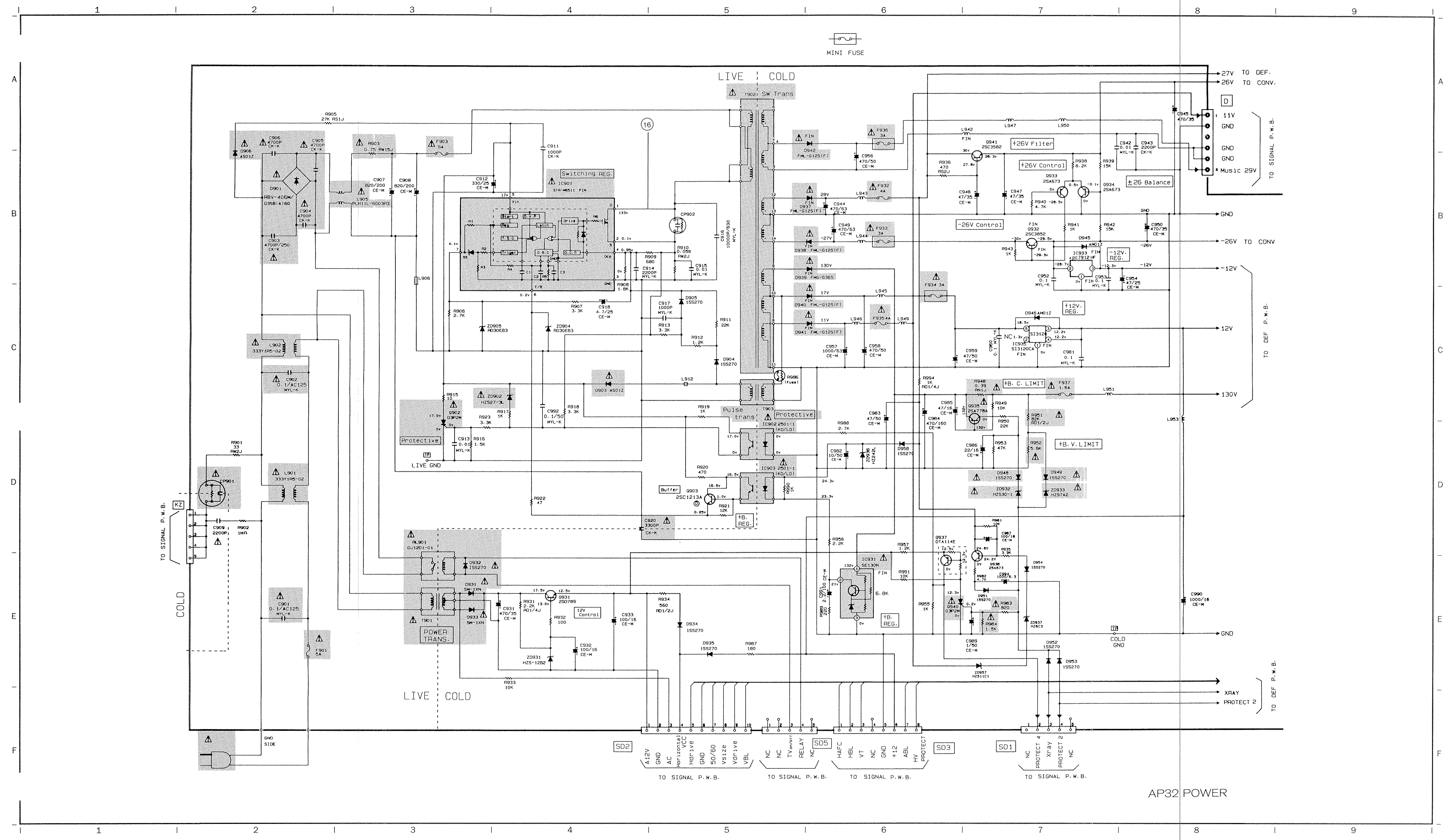
4.4. 2-Line Comb. P.W.B., MTS P.W.B. adjustment points


COMB FILTER
ADJUSTMENT 2
R5015
R5018
R5022
COMB FILTER
ADJUSTMENT 1
L5001
2 LINE COMB PWB
CX


FILTER
ADJ
R4114
VCO ADJ
R4007
SEPARATION
ADJ (LOW)
R4009
SEPARATION
ADJ (HIGH)
R4010
IC4001
MTS PWB
S1
S2

PRODUCT SAFETY NOTE: Components marked with a ⚠ and shaded have special characteristics important to safety. Before replacing any of these components, read carefully the PRODUCT SAFETY NOTICE of this Service Manual. Don't degrade the safety of the receiver through improper servicing.

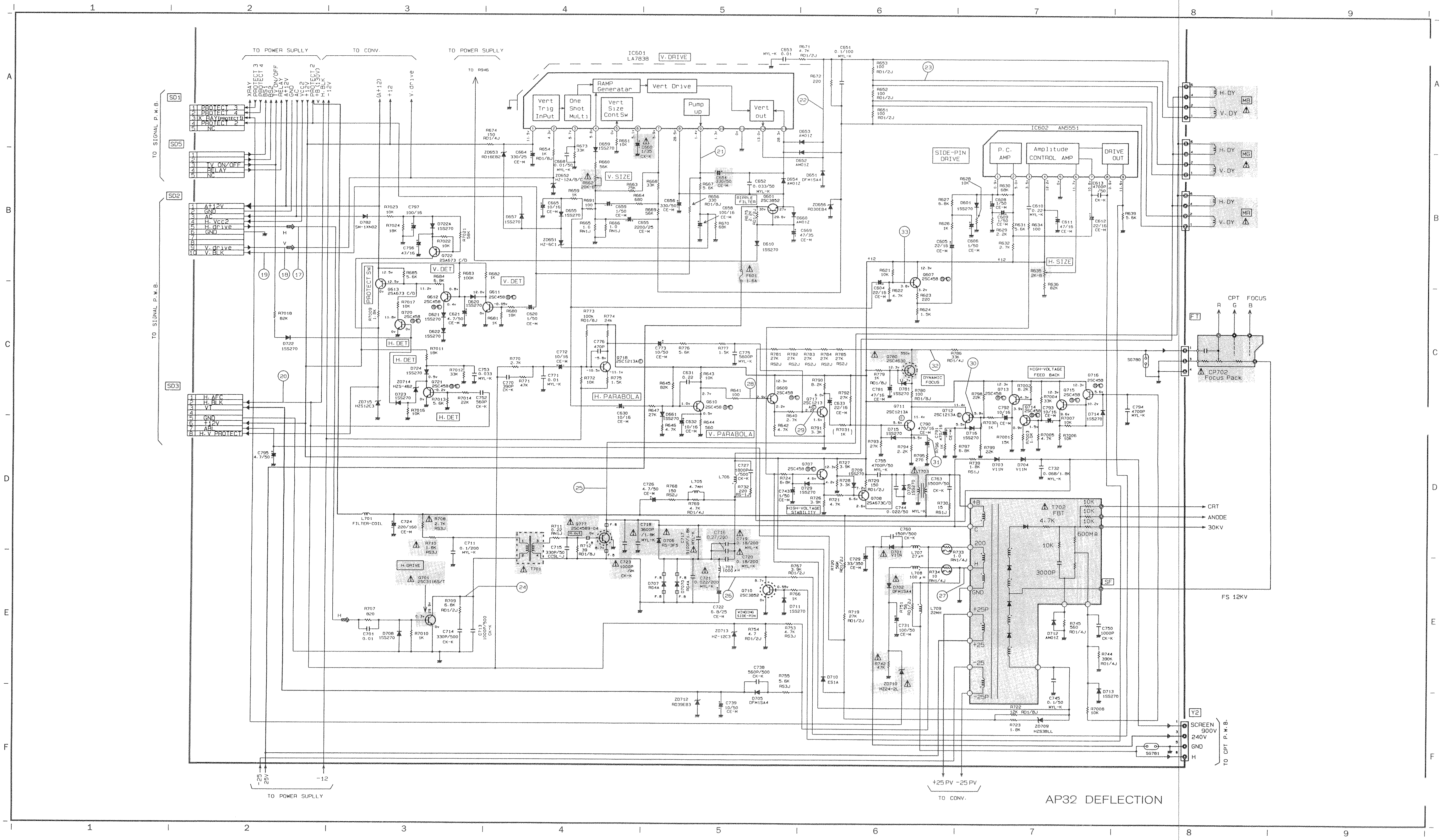
BASIC CIRCUIT DIAGRAM


1 2 3 4 5 6 7 8 9
A B C D E F
MINI FUSE
LIVE ¦ COLD
T902 SW Trans
Switching REG.
IC901 STR-M6511 FIN
Start
O.V.P
Latch
Drive
Reg
T.S.D
O.S.C
O.C.P
Trigger
R905 27K RS1J
C906 4700P CK-K
C905 4700P CK-K
D906 AS01Z
D901 RBV-406M/D3SB(A)60
C904 4700P CK-K
C903 4700P/250 CK-K
R903 0.75 RW15J
F903 5A
L905 PLH11L-6003R3
C907 820/200 CE-M
C908 820/200 CE-M
C911 1000P CK-K
C912 330/25 CE-M
CP902
C916 1000P/630 MYL-K
R909 680
R910 0.056 RW2J
C914 2200P MYL-K
C915 0.01 MYL-K
R908 1.8K
R907 3.3K
C918 4.7/25 CE-M
D905 1SS270
C917 1000P MYL-K
R913 3.3K
R911 22K
R912 1.2K
D904 1SS270
R906 2.7K
ZD905 RD30EB3
ZD904 RD30EB3
L906
L902 333Y1R5-02
C902 0.1/AC125 MYL-K
R915 10
Q902 DTC2M
ZD902 HZS27-3L
R923 3.3K
R917 1K
C992 0.1/50 MYL-K
R918 3.3K
C913 0.01 MYL-K
R916 1.5K
Protective
LIVE GND
D903 AS01Z
L912
R986 (Fuse)
R919 1K
Pulse trans
T903
Protective
IC902 2501-1 (KO/LO)
IC903 2501-1 (KO/LO)
R920 470
Buffer
Q903 2SC1213A
R921 12K
R922 47
C920 3300P CK-K
+B. REG.
R901 33 RW2J
CP901
L901 333Y1R5-02
KZ
TO SIGNAL P.W.B.
C909 2200P
R902 1MΩ
COLD
C901 0.1/AC125 MYL-K
F901 5A
RL901 DJ1201-01
D932 1SS270
D931 SM-1XN
D933 SM-1XN
T901
POWER TRANS.
Q931 2SD789
R931 2.2K RD1/4J
C931 470/35 CE-M
R932 100
12V Control
C933 100/16 CE-M
R934 560 RD1/2J
D934 1SS270
ZD931 HZS-12B2
C932 100/16 CE-M
D935 1SS270
R987 180
R933 10K
LIVE ¦ COLD
GND SIDE
D942 FML-G12S(F)
C956 470/50 CE-M
F936 3A
D937 FML-G12S(F)
28V
C944 470/63 CE-M
L943
F932 4A
D938 FML-G12S(F)
-27V
C949 470/63 CE-M
L944
F933 3A
D939 FMG-G36S
130V
D940 FML-G12S(F)
17V
L945
F934 3A
D941 FML-G12S(F)
11V
L946
F935 4A
L949
C957 1000/63 CE-M
C958 470/50 CE-M
L942 FIN
Q941 2SC3582
+26V Filter
+26V Control
R936 470 RS2J
C948 47/35 CE-M
C947 47/35 CE-M
Q933 2SA673
R938 8.2K
R939 15K
Q934 2SA673
±26 Balance
R940 4.7K
L947
L950
C942 0.01 MYL-K
C943 2200P CK-K
C945 470/35
D
11V
GND
GND
GND
Music 29V
TO SIGNAL P.W.B.
27V TO DEF.
26V TO CONV.
-26V Control
Q932 2SC3852 FIN
R943 1K
R941 1K
R942 15K
D945 AM01Z
IC933 µPC7912HF FIN
-12V. REG.
C950 470/35 CE-M
C952 0.1 MYL-K
C953 0.1 MYL-K
C954 47/25 CE-M
GND
-26V TO CONV
-12V
12V
130V
TO DEF P.W.B.
D946 AM01Z
+12V. REG.
IC935 SI3120CA FIN
C959 47/50 CE-M
C960 0.1 MYL-K
C961 0.1 MYL-K
R994 1K RD1/4J
R948 0.39 RN1J
+B. C. LIMIT
F937 1.6A
L951
Q935 2SA778A
R949 10K
C985 47/16 CE-M
C984 470/160 CE-M
R951 82K RD1/2J
R950 22K
C983 47/50 CE-M
R988 2.7K
C982 10/50 CE-M
ZD936 HZ24-2L
D958 1SS270
C986 22/16 CE-M
R953 47K
R952 5.6K
+B. V. LIMIT
D948 1SS270
D949 1SS270
ZD932 HZS30-1
ZD933 HZS7A2
L953
R990 1K
R956 2.2K
IC931 SE130N FIN
R957 1.2K
Q937 DTA114E
Q938 2SA673
R961 10K
C987 100/16 CE-M
R935 3.3K
D954 1SS270
R991 10K
6.8K
+B. REG.
R955 1K
Q940 DTC2M
R982 4.7K
C994 1000/6.3
D951 1SS270
R983 820
R984 1.5K
ZD937 HZ6C3
C989 1/50 CE-M
C990 1000/16 CE-M
COLD GND
GND
D952 1SS270
D953 1SS270
ZD957 HZ511C1
XRAY
PROTECT 2
TO DEF P.W.B.
SD2
A12V GND AC Horizontal VCC Hdrive GND 50/60 Vsize Vdrive VBL
SD5
NC NC TVon/off RELAY NC
SD3
HAFC HBL VT NC GND +12 ABL HV PROTECT
SD1
NC PROTECT 4 Xray PROTECT 2 NC
TO SIGNAL P.W.B.
AP32 POWER

- All DC voltage to be measured with a tester (100kΩ/V). Voltage taken on a complex color bar signal including a standard color bar signal.
- Since this is a basic circuit diagram, the value of the parts is subject to be altered for improvement.

PRODUCT SAFETY NOTE: Components marked with a ⚠ and shaded have special characteristics important to safety. Before replacing any of these components, read carefully the PRODUCT SAFETY NOTICE of this Service Manual. Don't degrade the safety of the receiver through improper servicing.

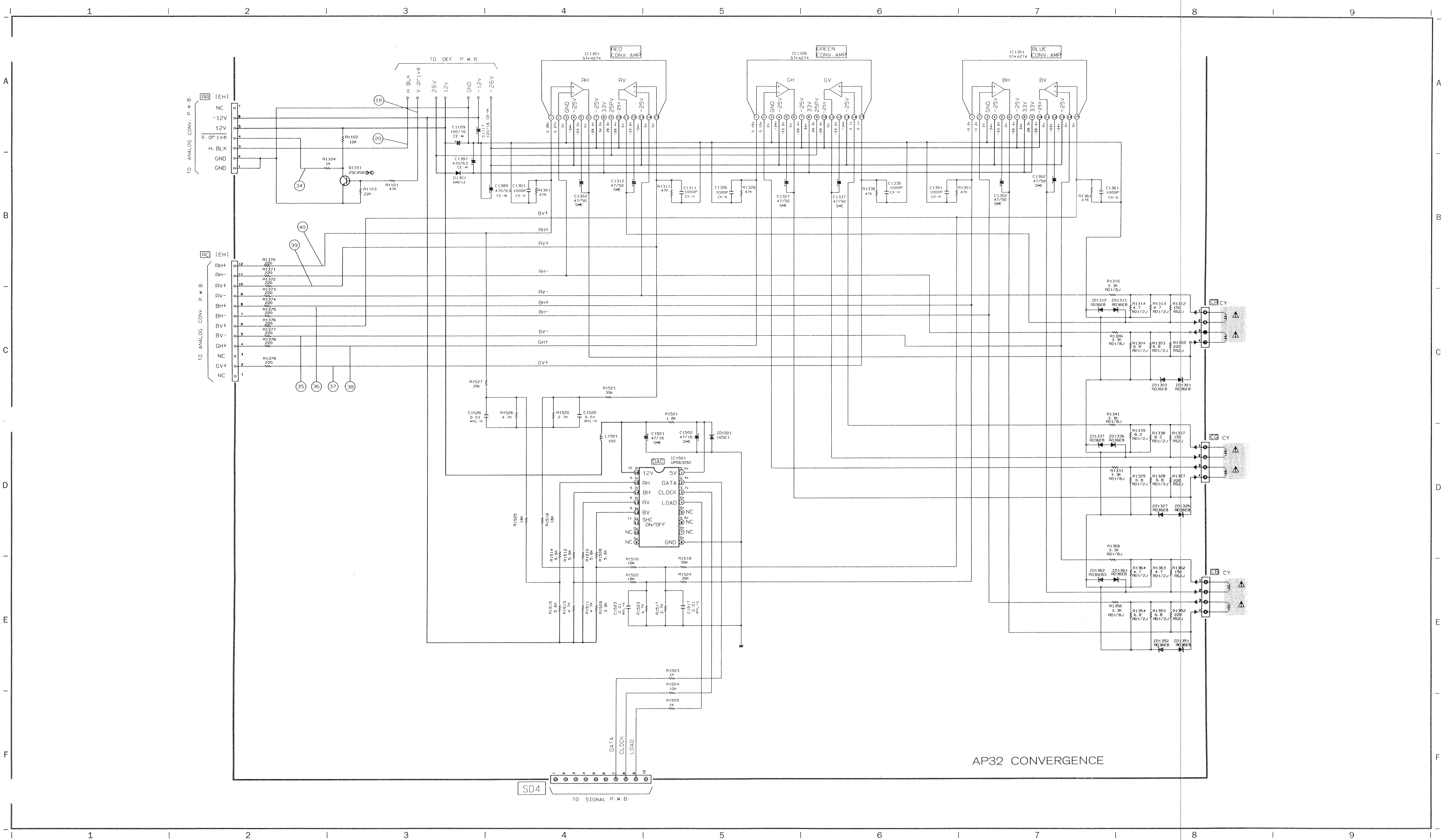
BASIC CIRCUIT DIAGRAM


TO POWER SUPLLY
TO CONV.
TO POWER SUPLLY
TO R946
IC601 LA7838
V. DRIVE
RAMP Generatar
Vert Drive
Vert Trig InPut
One Shot Multi
Vert Size Cont Sw
Pump up
Vert out
V. SIZE
RIPPLE FILTER
IC602 AN5551
SIDE-PIN DRIVE
P.C. AMP
Amplitude CONTROL AMP
DRIVE OUT
H. SIZE
H. DY
V. DY
MB
MG
MR
SD1
SD5
SD2
SD3
TO SIGNAL P.W.B.
PROTECT 3
PROTECT 4
X RAY
PROTECT 2
NC
TV ON/OFF
RELAY
A+12V
GND
AC
H. Vcc2
H. drive
V. drive
V. BLK
H. AFC
H. BLK
VT
+12V
ABL
H.V PROTECT
PROTECT SW
V. DET
H. DET
H. PARABOLA
V. PARABOLA
DYNAMIC FOCUS
HIGH-VOLTAGE FEED BACK
HIGH-VOLTAGE STABILITY
L701 FILTER-COIL
H. DRIVE
T701
WINDING SIDE-PIN
T702 FBT
600MA
SF
CPT FOCUS
R G B
FT
CP702 Focus Pack
CRT
ANODE
30KV
FS 12KV
Y2
SCREEN 900V
240V
GND
H
TO CPT P.W.B.
-25 25V
-12
TO POWER SUPLLY
+25PV -25PV
TO CONV.
AP32 DEFLECTION
1 2 3 4 5 6 7 8 9
A B C D E F

- All DC voltage to be measured with a tester (100kΩ/V). Voltage taken on a complex color bar signal including a standard color bar signal.
- Since this is a basic circuit diagram, the value of the parts is subject to be altered for improvement.

PRODUCT SAFETY NOTE: Components marked with a ⚠ and shaded have special characteristics important to safety. Before replacing any of these components, read carefully the PRODUCT SAFETY NOTICE of this Service Manual. Don't degrade the safety of the receiver through improper servicing.

BASIC CIRCUIT DIAGRAM

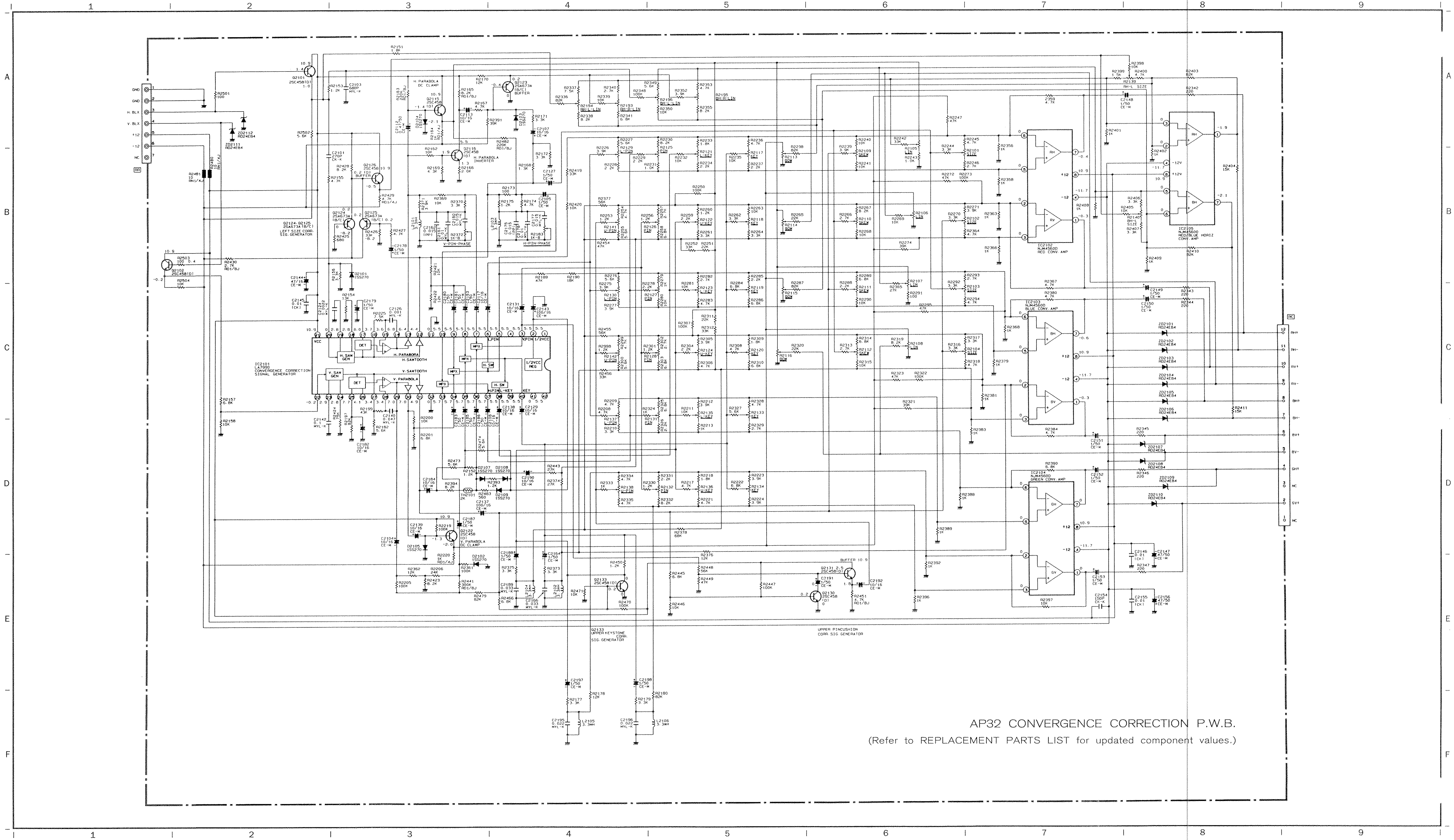


1
2
3
4
5
6
7
8
9
A
B
C
D
E
F
TO DEF P.W.B.
H.BLK
V.drive
26V
12V
GND
-12V
-26V
AA (EH)
TO ANALOG CONV. P.W.B.
NC
-12V
12V
V.drive
H.BLK
GND
GND
AC (EH)
RH+
RH-
RV+
RV-
BH+
BH-
BV+
BV-
GH+
NC
GV+
NC
IC1301 STK4274
RED CONV. AMP
IC1326 STK4274
GREEN CONV. AMP
IC1351 STK4274
BLUE CONV. AMP
RH
RV
GH
GV
BH
BV
Q1101 2SC458
D1301 AM01Z
DAC
IC1501 uPD6326C
12V
5V
RH
DATA
BH
CLOCK
RV
LOAD
BV
NC
SHC ON/OFF
NC
NC
NC
GND
L1501 100
ZD1501 HZ5C1
CR CY
CG CY
CB CY
DATA
CLOCK
LOAD
SD4
TO SIGNAL P.W.B.
AP32 CONVERGENCE

- All DC voltage to be measured with a tester (100kΩ/V). Voltage taken on a complex color bar signal including a standard color bar signal.
- Since this is a basic circuit diagram, the value of the parts is subject to be altered for improvement.

PRODUCT SAFETY NOTE: Components marked with a ⚠ and shaded have special characteristics important to safety. Before replacing any of these components, read carefully the PRODUCT SAFETY NOTICE of this Service Manual. Don't degrade the safety of the receiver through improper servicing.

BASIC CIRCUIT DIAGRAM


1
2
3
4
5
6
7
8
9
A
B
C
D
E
F
GND
GND
H.BLX
V.BLX
+12
-12
NC
IC2101 LA7990 CONVERGENCE CORRECTION SIGNAL GENERATOR
Q2124,Q2125 2SA673A(B/C) LEFT SIZE CORR. SIG. GENERATOR
H.PARABOLA DC CLAMP
H.PARABOLA INVERTER
BUFFER
V-PIN-PHASE
H-PIN-PHASE
V.PARABOLA DC CLAMP
IC2102 NJM4560D RED CONV. AMP
IC2103 NJM4560D BLUE CONV. AMP
IC2104 NJM4560D GREEN CONV. AMP
IC2105 NJM4560D RED/BLUE HORIZ CONV. AMP
Q2133 UPPER KEYSTONE CORR. SIG. GENERATOR
UPPER PINCUSHION CORR. SIG. GENERATOR
RH+
RH-
RV+
RV-
BH+
BH-
BV+
BV-
GH+
NC
GV+
NC

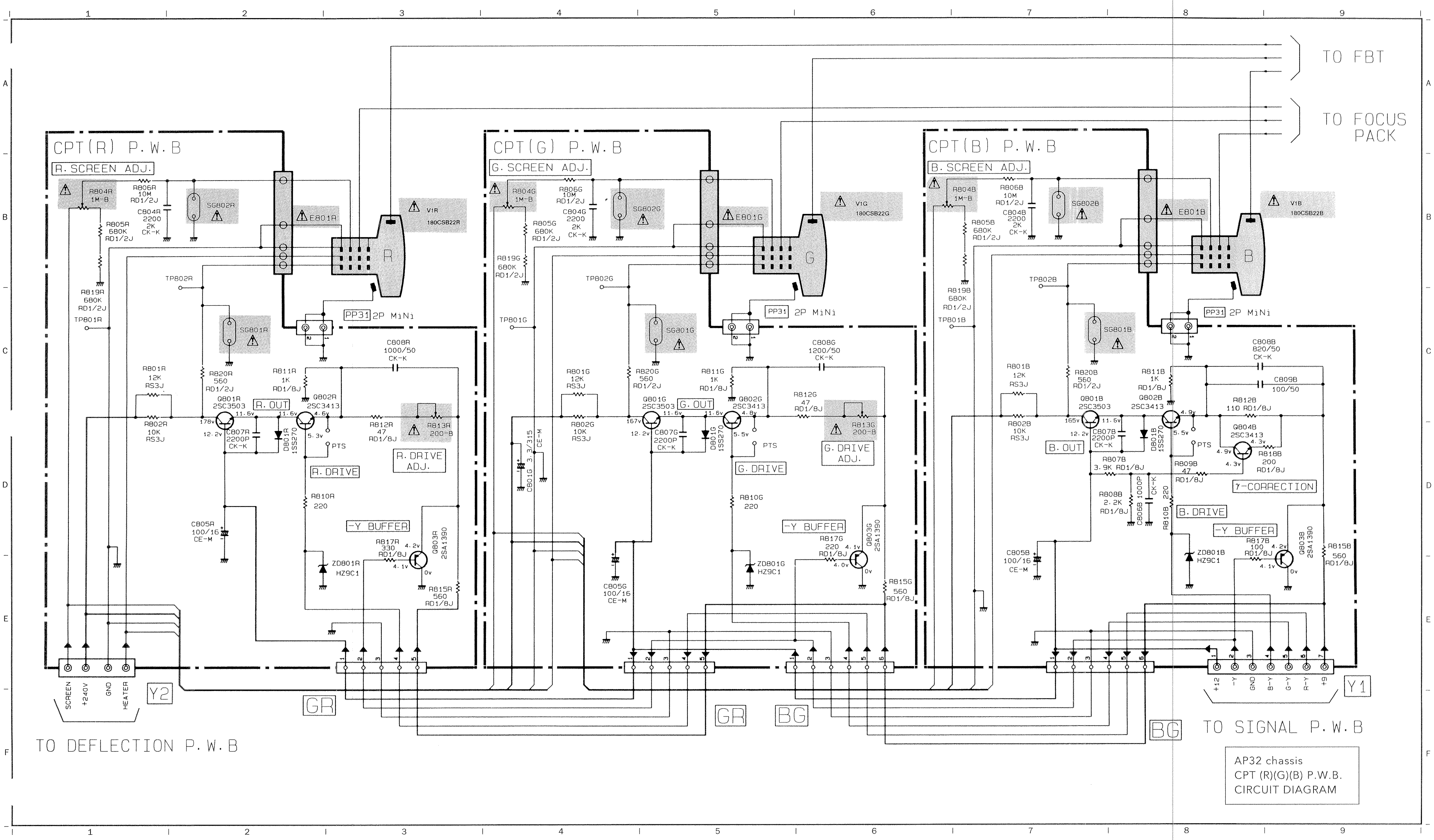
AP32 CONVERGENCE CORRECTION P.W.B.

(Refer to REPLACEMENT PARTS LIST for updated component values.)

- All DC voltage to be measured with a tester (100kΩ/V). Voltage taken on a complex color bar signal including a standard color bar signal.
- Since this is a basic circuit diagram, the value of the parts is subject to be altered for improvement.

PRODUCT SAFETY NOTE: Components marked with a ⚠ and shaded have special characteristics important to safety. Before replacing any of these components, read carefully the PRODUCT SAFETY NOTICE of this Service Manual. Don't degrade the safety of the receiver through improper servicing.

BASIC CIRCUIT DIAGRAM

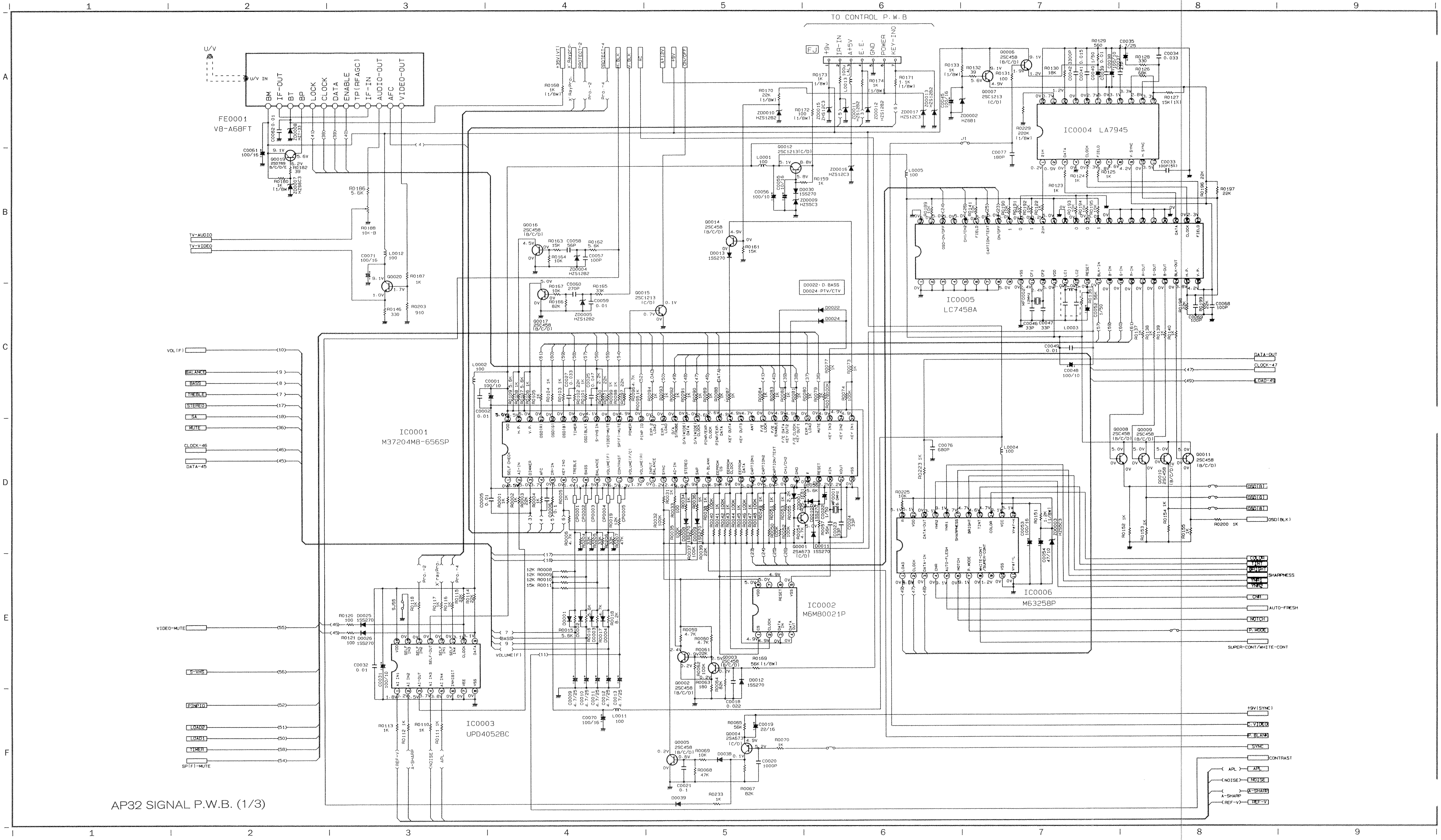

1
2
3
4
5
6
7
8
9
A
B
C
D
E
F
TO FBT
TO FOCUS PACK
CPT(R) P.W.B
R. SCREEN ADJ.
R804R 1M-B
R806R 10M RD1/2J
C804R 2200 2K CK-K
SG802R
R805R 680K RD1/2J
E801R
V1R 180CSB22R
R
R819R 680K RD1/2J
TP802R
TP801R
SG801R
PP31 2P MiNi
C808R 1000/50 CK-K
R801R 12K RS3J
R802R 10K RS3J
R820R 560 RD1/2J
R811R 1K RD1/8J
Q801R 2SC3503
R. OUT
Q802R 2SC3413
178v
12.2v
11.6v
11.6v
4.6v
5.3v
C807R 2200P CK-K
D801R 1SS270
PTS
R812R 47 RD1/8J
R813R 200-B
R. DRIVE ADJ.
R. DRIVE
R810R 220
C805R 100/16 CE-M
-Y BUFFER
R817R 330 RD1/8J
4.2v
4.1v
0v
Q803R 2SA1390
ZD801R HZ9C1
R815R 560 RD1/8J
CPT(G) P.W.B
G. SCREEN ADJ.
R804G 1M-B
R806G 10M RD1/2J
C804G 2200 2K CK-K
SG802G
R805G 680K RD1/2J
E801G
V1G 180CSB22G
G
R819G 680K RD1/2J
TP802G
TP801G
SG801G
PP31 2P MiNi
C808G 1200/50 CK-K
R801G 12K RS3J
R802G 10K RS3J
R820G 560 RD1/2J
R811G 1K RD1/8J
Q801G 2SC3503
G. OUT
Q802G 2SC3413
167v
12.2v
11.6v
11.6v
4.8v
5.5v
C807G 2200P CK-K
D801G 1SS270
PTS
R812G 47 RD1/8J
R813G 200-B
G. DRIVE ADJ.
G. DRIVE
C801G 3.3/315 CE-M
R810G 220
C805G 100/16 CE-M
-Y BUFFER
R817G 220 RD1/8J
4.1v
4.0v
0v
Q803G 2SA1390
ZD801G HZ9C1
R815G 560 RD1/8J
CPT(B) P.W.B
B. SCREEN ADJ.
R804B 1M-B
R806B 10M RD1/2J
C804B 2200 2K CK-K
SG802B
R805B 680K RD1/2J
E801B
V1B 180CSB22B
B
R819B 680K RD1/2J
TP802B
TP801B
SG801B
PP31 2P MiNi
C808B 820/50 CK-K
C809B 100/50
R801B 12K RS3J
R802B 10K RS3J
R820B 560 RD1/2J
R811B 1K RD1/8J
Q801B 2SC3503
Q802B 2SC3413
R812B 110 RD1/8J
165v
12.2v
11.5v
4.9v
5.5v
C807B 2200P CK-K
D801B 1SS270
B. OUT
PTS
Q804B 2SC3413
4.3v
4.9v
4.3v
R818B 200 RD1/8J
R807B 3.9K RD1/8J
R809B 47 RD1/8J
γ-CORRECTION
R808B 2.2K RD1/8J
C806B 1000P CK-K
R810B 220
B. DRIVE
-Y BUFFER
R817B 100 RD1/8J
4.2v
4.1v
0v
Q803B 2SA1390
R815B 560 RD1/8J
C805B 100/16 CE-M
ZD801B HZ9C1
SCREEN
+240V
GND
HEATER
Y2
TO DEFLECTION P.W.B
GR
GR
BG
BG
+12
-Y
GND
B-Y
G-Y
R-Y
+9
Y1
TO SIGNAL P.W.B

AP32 chassis
CPT (R)(G)(B) P.W.B.
CIRCUIT DIAGRAM

- All DC voltage to be measured with a tester (100kΩ/V). Voltage taken on a complex color bar signal including a standard color bar signal.
- Since this is a basic circuit diagram, the value of the parts is subject to be altered for improvement.

PRODUCT SAFETY NOTE: Components marked with a ⚠ and shaded have special characteristics important to safety. Before replacing any of these components, read carefully the PRODUCT SAFETY NOTICE of this Service Manual. Don't degrade the safety of the receiver through improper servicing.

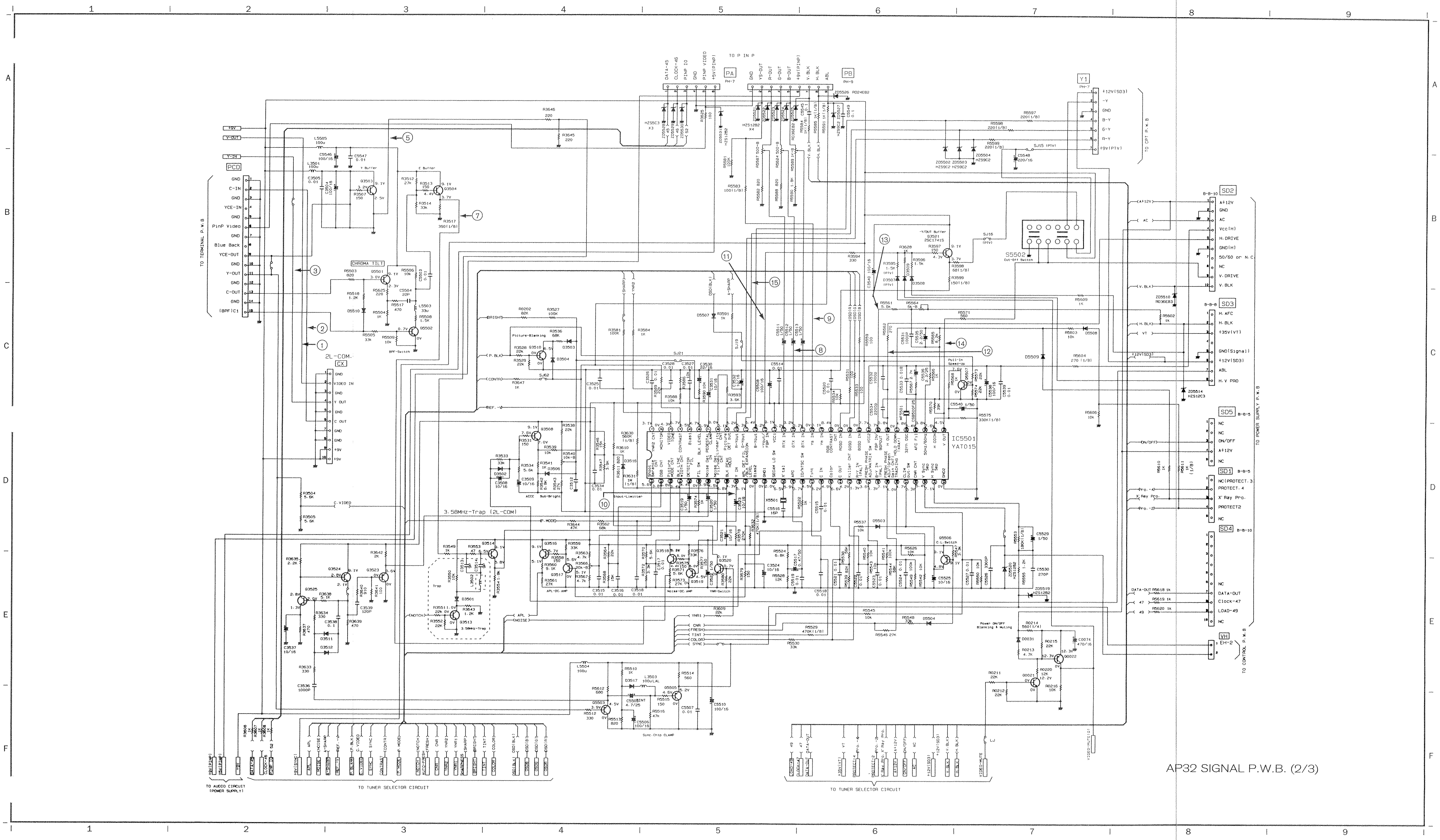
BASIC CIRCUIT DIAGRAM


TO CONTROL P.W.B
FE0001
V8-A68FT
IC0001
M37204M8-656SP
IC0002
M6M80021P
IC0003
UPD4052BC
IC0004 LA7945
IC0005
LC7458A
IC0006
M63258P
TV-AUDIO
TV-VIDEO
VOL(F)
BALANCE
BASS
TREBLE
STEREO
SA
MUTE
CLOCK-46
DATA-45
VIDEO-MUTE
S-VHS
PINPIO
LOAD2
LOAD1
TIMER
SP(F)-MUTE
DATA-OUT
CLOCK-47
LOAD-49
OSD(R)
OSD(G)
OSD(B)
OSD(BLK)
COLOR
TINT
BRIGHT
SHARPNESS
CNR
AUTO-FRESH
NOTCH
P.MODE
SUPER-CONT/WHITE-CONT
+9V(SYNC)
C.VIDEO
P.BLANK
SYNC
CONTRAST
APL
NOISE
A-SHARP
REF-V
D0022: D.BASS
D0024: PTV/CTV
AP32 SIGNAL P.W.B. (1/3)

- All DC voltage to be measured with a tester (100kΩ/V). Voltage taken on a complex color bar signal including a standard color bar signal.
- Since this is a basic circuit diagram, the value of the parts is subject to be altered for improvement.

PRODUCT SAFETY NOTE: Components marked with a ⚠ and shaded have special characteristics important to safety. Before replacing any of these components, read carefully the PRODUCT SAFETY NOTICE of this Service Manual. Don't degrade the safety of the receiver through improper servicing.

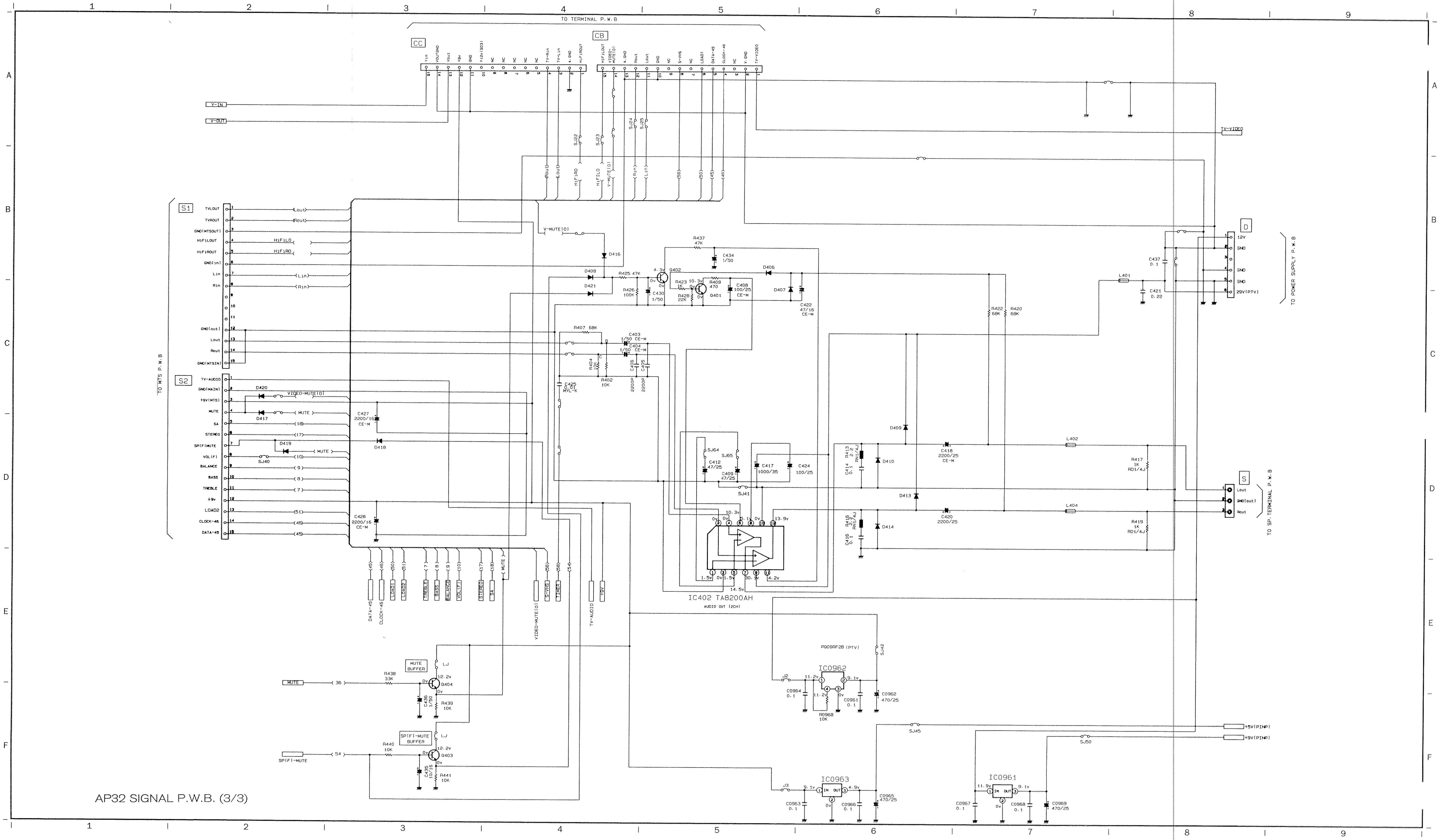
BASIC CIRCUIT DIAGRAM


1
2
3
4
5
6
7
8
9
A
B
C
D
E
F
TO P IN P
PA
PB
Y1
TO CPT P.W.B
PCD
TO TERMINAL P.W.B
GND
C-IN
YCE-IN
PinP Video
Blue Back
YCE-OUT
Y-OUT
C-OUT
(BPF)C1
+9V
V-OUT
Y-IN
2L-COM.
CX
VIDEO IN
Y OUT
C OUT
Y Buffer
C Buffer
CHROMA TILT
BPF-Switch
Picture-Blanking
3.58MHz-Trap (2L-COM)
Trap
3.58MHz-Trap
APL-DC.AMP
Noise-DC.AMP
YNR-Switch
Input-Limitter
ACCC
Sub-Bright
Sync-Chip CLAMP
IC5501
YAT015
Y/OUT Buffer
Cut-Off Switch
S5502
Pull-In Speed-Up
C.L.Switch
Power ON/OFF Blanking & Muting
SD2
SD3
SD5
SD1
SD4
VH
A+12V
GND
AC
Vcc(H)
H.DRIVE
GND(H)
50/60 or N.C.
NC
V.DRIVE
V.BLK
H.AFC
H.BLK
+35V(VT)
GND(Signal)
+12V(SD3)
ABL
H.V PRO
ON/OFF
NC(PROTECT.3
PROTECT.4
X'Ray Pro.
PROTECT2
DATA-OUT
Clock-47
LOAD-49
EH-2
TO POWER SUPPLY P.W.B
TO CONTROL P.W.B
TO AUDIO CIRCUIT (POWER SUPPLY)
TO TUNER SELECTOR CIRCUIT
TO TUNER SELECTOR CIRCUIT
AP32 SIGNAL P.W.B. (2/3)

- All DC voltage to be measured with a tester (100kΩ/V). Voltage taken on a complex color bar signal including a standard color bar signal.
- Since this is a basic circuit diagram, the value of the parts is subject to be altered for improvement.

PRODUCT SAFETY NOTE: Components marked with a ⚠ and shaded have special characteristics important to safety. Before replacing any of these components, read carefully the PRODUCT SAFETY NOTICE of this Service Manual. Don't degrade the safety of the receiver through improper servicing.

BASIC CIRCUIT DIAGRAM

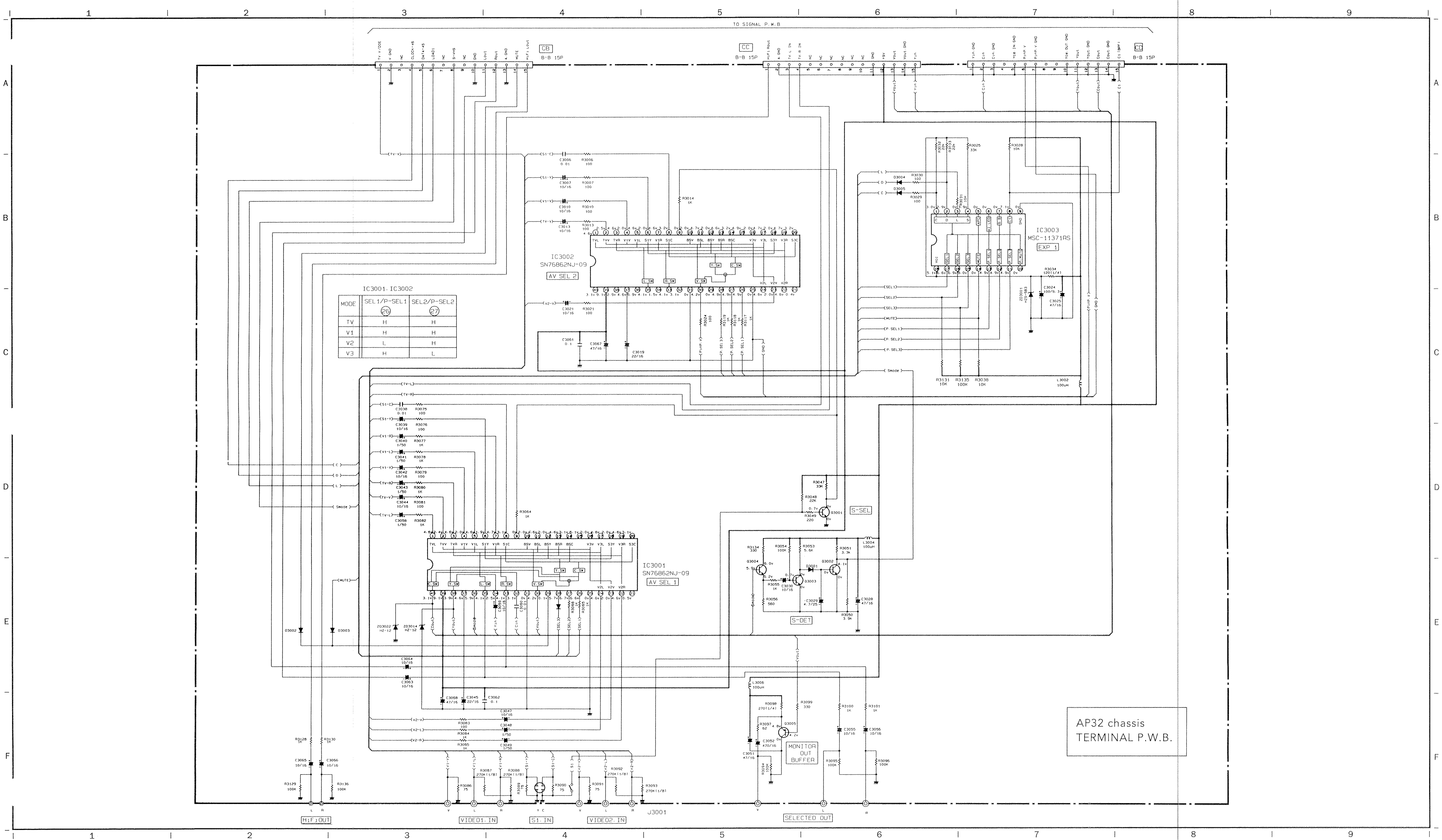

TO TERMINAL P.W.B
CC
CB
Y-IN
V-OUT
TV-VIDEO
S1
S2
TO MTS P.W.B
TVLOUT
TVROUT
GND(MTSOUT)
HiFiLOUT
HiFiROUT
GND(in)
Lin
Rin
GND(out)
Lout
Rout
GND(MTSIN)
TV-AUDIO
GND(MAIN)
+5V(MTS)
MUTE
SA
STEREO
SP(F)MUTE
VOL(F)
BALANCE
BASS
TREBLE
+9v
LOAD2
CLOCK-45
DATA-45
V-MUTE(O)
VIDEO-MUTE(O)
D415
D408
D421
D420
D417
D419
D418
SJ40
Q402
Q401
R437 47K
C434 1/50
R425 47K
R426 100K
C430 1/50
R423
R428 22K
R409 470
C408 100/25 CE-M
D406
D407
C422 47/16 CE-M
R407 68K
C403 1/50 CE-M
C404 1/50 CE-M
R404 10K
R402 10K
C406 2200P
C405 2200P
C425 0.01 MYL-K
C427 2200/16 CE-M
C428 2200/16 CE-M
SJ64
SJ65
C412 47/25
C409 47/25
C417 1000/35
C424 100/25
SJ41
IC402 TA8200AH
AUDIO OUT (2CH)
R422 68K
R420 68K
D409
D410
D413
D414
C418 2200/25 CE-M
C420 2200/25
R413 2.2 RN1/4J
R416 2.2 RN1/4J
C414 0.1
C416 0.1
L401
L402
L404
C437 0.1
C421 0.22
R417 1K RD1/4J
R419 1K RD1/4J
D
12V
GND
29V(PTV)
TO POWER SUPPLY P.W.B
S
Lout
GND(out)
Rout
TO SP.TERMINAL P.W.B
DATA-45
CLOCK-45
LOAD2
TREBLE
BASS
BALANCE
VOL(F)
STEREO
SA
MUTE
VIDEO-MUTE(O)
S-VHS
TIMER
TV-AUDIO
+5V
MUTE BUFFER
R438 33K
Q404
C436 1/50
R439 10K
SP(F)-MUTE BUFFER
R440 10K
Q403
C435 10/16
R441 10K
MUTE
SP(F)-MUTE
PQ09RF2B (PTV)
SJ42
J2
IC0962
C0964 0.1
C0961 0.1
C0962 470/25
R0968 10K
SJ45
SJ50
+5V(PINP)
+9V(PINP)
J3
IC0963
C0963 0.1
C0966 0.1
C0965 470/25
IC0961
C0967 0.1
C0968 0.1
C0969 470/25

AP32 SIGNAL P.W.B. (3/3)

- All DC voltage to be measured with a tester (100kΩ/V). Voltage taken on a complex color bar signal including a standard color bar signal.
- Since this is a basic circuit diagram, the value of the parts is subject to be altered for improvement.

PRODUCT SAFETY NOTE: Components marked with a ⚠ and shaded have special characteristics important to safety. Before replacing any of these components, read carefully the PRODUCT SAFETY NOTICE of this Service Manual. Don't degrade the safety of the receiver through improper servicing.

BASIC CIRCUIT DIAGRAM


TO SIGNAL P.W.B
CB B-B 15P
CC B-B 15P
CD B-B 15P
IC3002 SN76862NJ-09 AV SEL 2
IC3001 SN76862NJ-09 AV SEL 1
IC3003 MSC-11371RS EXP 1
S-SEL
S-DET
MONITOR OUT BUFFER
J3001
HiFi OUT
VIDEO1 IN
S1 IN
VIDEO2 IN
SELECTED OUT
AP32 chassis
TERMINAL P.W.B.

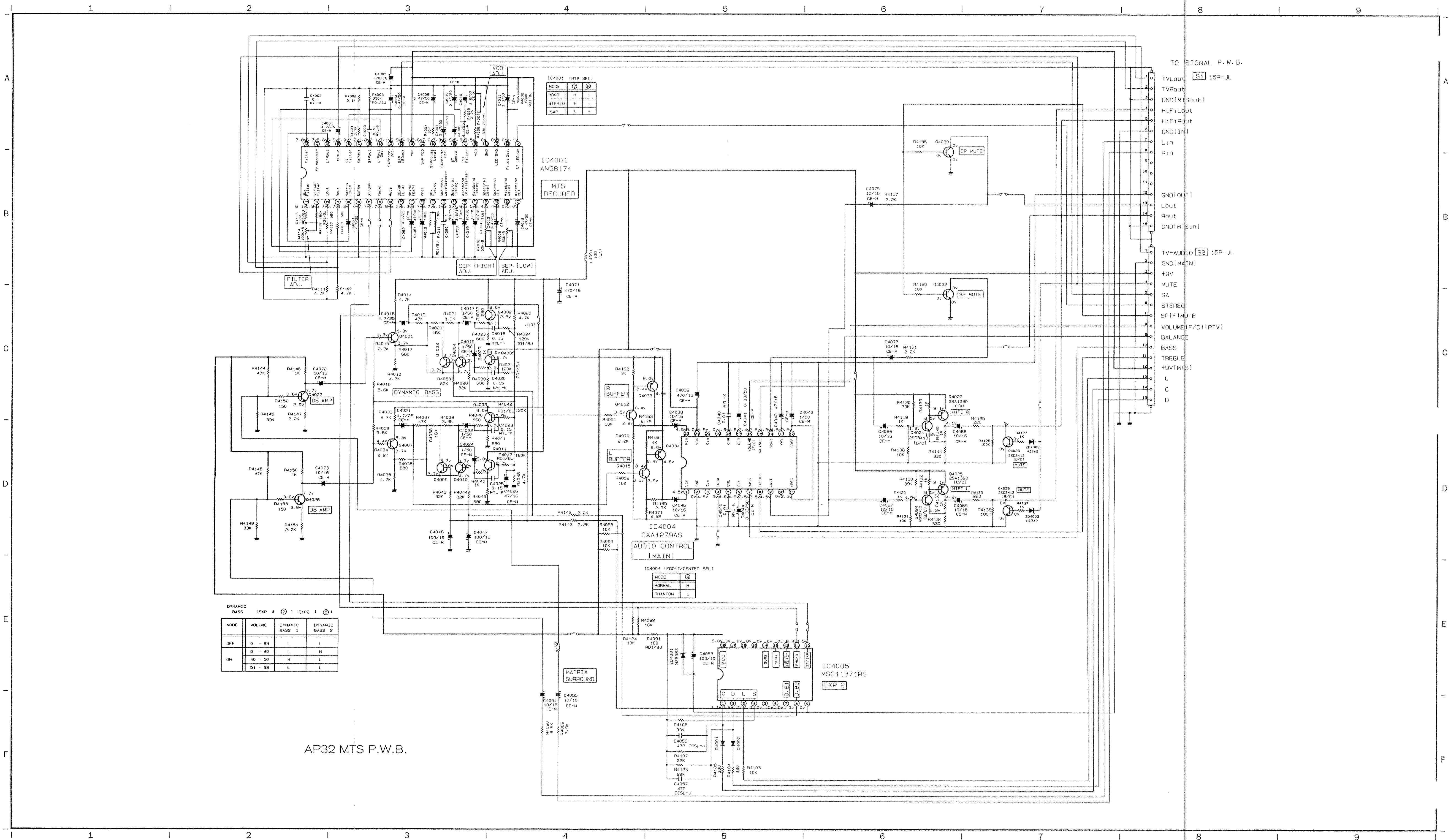
IC3001, IC3002

MODE	SEL1/P-SEL1 ㉖	SEL2/P-SEL2 ㉗
TV	H	H
V1	H	H
V2	L	H
V3	H	L

- All DC voltage to be measured with a tester (100kΩ/V). Voltage taken on a complex color bar signal including a standard color bar signal.
- Since this is a basic circuit diagram, the value of the parts is subject to be altered for improvement.

PRODUCT SAFETY NOTE: Components marked with a ⚠ and shaded have special characteristics important to safety. Before replacing any of these components, read carefully the PRODUCT SAFETY NOTICE of this Service Manual. Don't degrade the safety of the receiver through improper servicing.

BASIC CIRCUIT DIAGRAM



IC4001
AN5817K
MTS DECODER
VCO ADJ.
FILTER ADJ.
SEP. (HIGH) ADJ.
SEP. (LOW) ADJ.
DYNAMIC BASS
DB AMP
R BUFFER
L BUFFER
IC4004
CXA1279AS
AUDIO CONTROL (MAIN)
IC4005
MSC11371RS
EXP 2
MATRIX SURROUND
SP MUTE
HIFI R
HIFI L
MUTE
TO SIGNAL P.W.B.
S1 15P-JL
TVLout
TVRout
GND(MTSout)
HiFiLout
HiFiRout
GND(IN)
Lin
Rin
GND(OUT)
Lout
Rout
GND(MTSin)
S2 15P-JL
TV-AUDIO
GND(MAIN)
+9V
MUTE
SA
STEREO
SP(F)MUTE
VOLUME(F/C)(PTV)
BALANCE
BASS
TREBLE
+9V(MTS)
L
C
D
AP32 MTS P.W.B.

IC4001 (MTS SEL)

MODE	⑦	⑧
MONO	H	L
STEREO	H	H
SAP	L	H

IC4004 (FRONT/CENTER SEL)

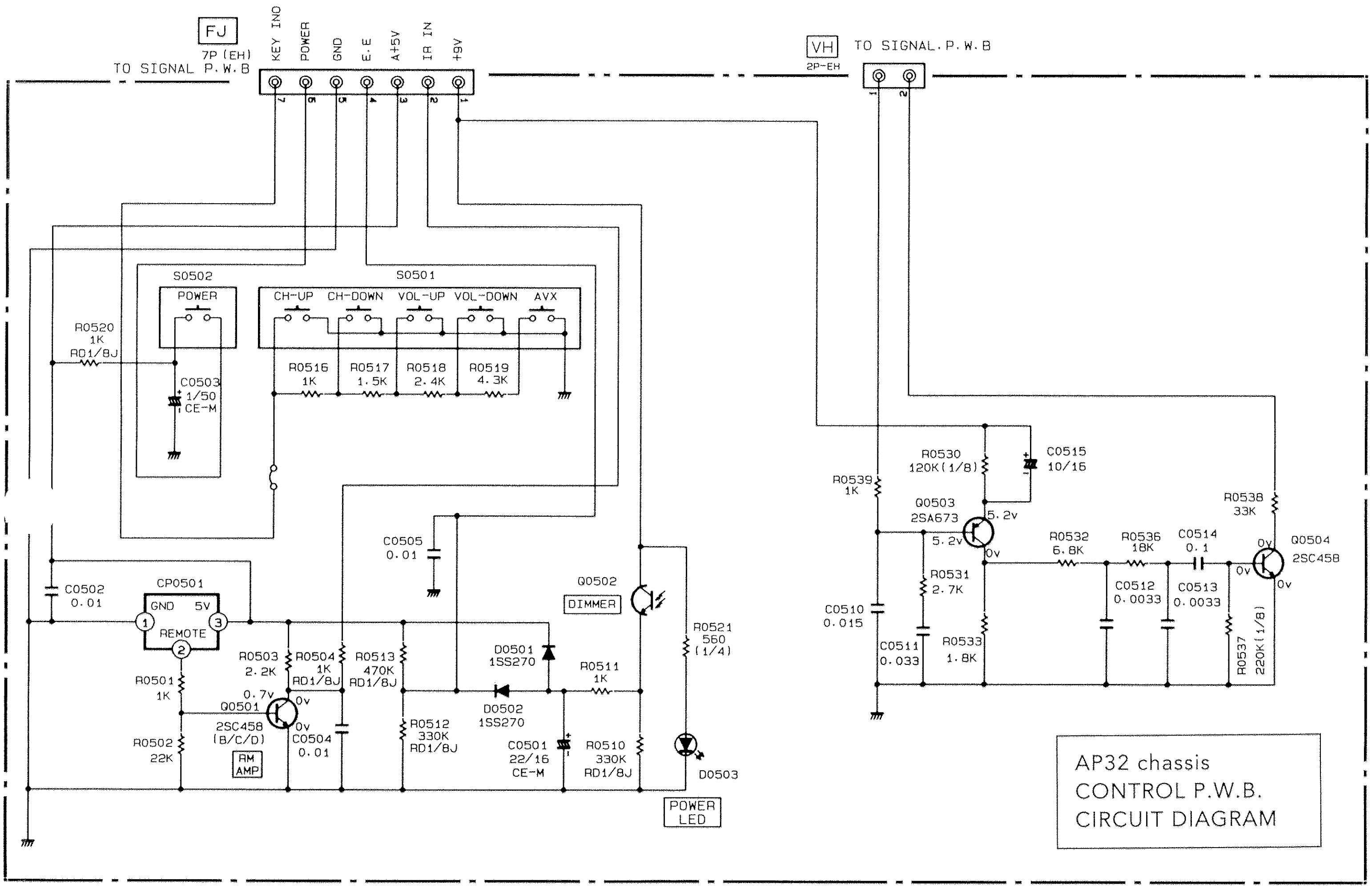
MODE	④
MORMAL	H
PHANTOM	L

DYNAMIC BASS (EXP # ⑦) (EXP2 # ⑧)

NODE	VOLUME	DYNAMIC BASS 1	DYNAMIC BASS 2
OFF	0 ~ 63	L	L
ON	0 ~ 40	L	H
	40 ~ 50	H	L
	51 ~ 63	L	L

- All DC voltage to be measured with a tester (100kΩ/V). Voltage taken on a complex color bar signal including a standard color bar signal.
- Since this is a basic circuit diagram, the value of the parts is subject to be altered for improvement.

BASIC CIRCUIT DIAGRAM


FJ
7P (EH)
TO SIGNAL P.W.B
KEY INO
POWER
GND
E.E
A+5V
IR IN
+9V
VH
2P-EH
TO SIGNAL.P.W.B
S0502
POWER
S0501
CH-UP
CH-DOWN
VOL-UP
VOL-DOWN
AVX
R0520
1K
RD1/8J
C0503
1/50
CE-M
R0516
1K
R0517
1.5K
R0518
2.4K
R0519
4.3K
C0505
0.01
C0502
0.01
CP0501
GND 5V
REMOTE
R0501
1K
R0502
22K
R0503
2.2K
R0504
1K
RD1/8J
R0513
470K
RD1/8J
0.7v
0v
Q0501
2SC458
(B/C/D)
RM AMP
C0504
0.01
R0512
330K
RD1/8J
D0501
1SS270
D0502
1SS270
C0501
22/16
CE-M
R0511
1K
R0510
330K
RD1/8J
Q0502
DIMMER
R0521
560
(1/4)
D0503
POWER LED
R0539
1K
R0530
120K(1/8)
C0515
10/16
Q0503
2SA673
5.2v
5.2v
0v
R0531
2.7K
C0510
0.015
C0511
0.033
R0533
1.8K
R0532
6.8K
R0536
18K
C0514
0.1
C0512
0.0033
C0513
0.0033
R0538
33K
Q0504
2SC458
0v
0v
0v
R0537
220K(1/8)

AP32 chassis
CONTROL P.W.B.
CIRCUIT DIAGRAM

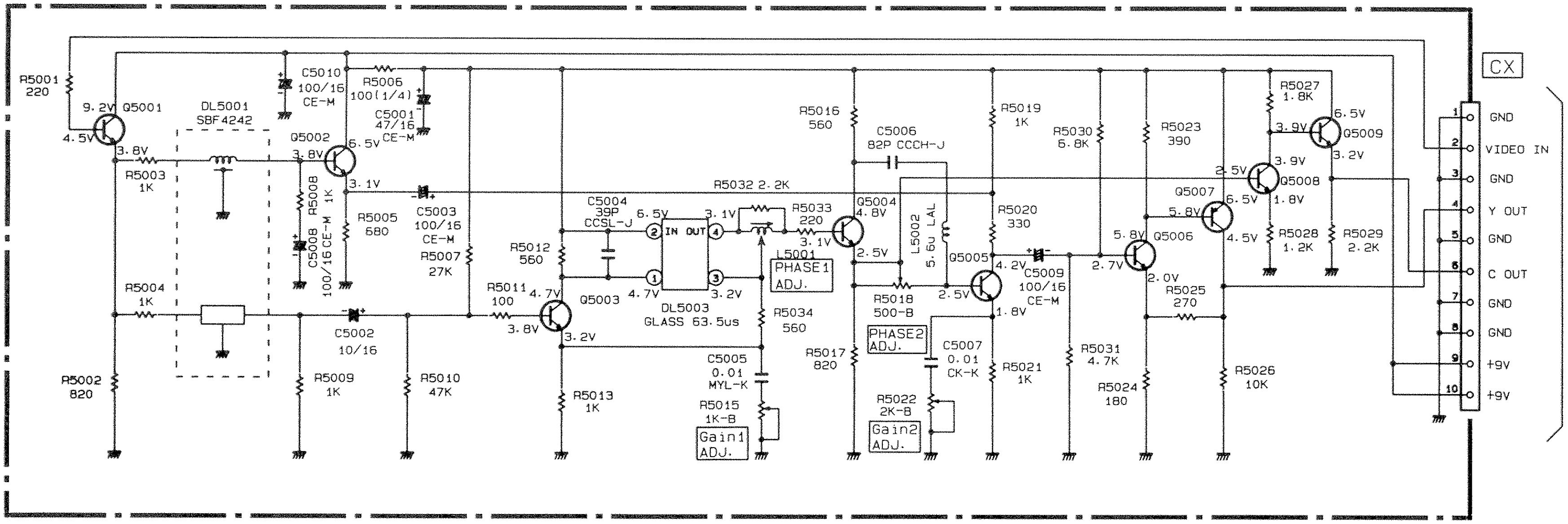
PRODUCT SAFETY NOTE: Components marked with a ⚠ and shaded have special characteristics important to safety. Before replacing any of these components, read carefully the PRODUCT SAFETY NOTICE of this Service Manual. Don't degrade the safety of the receiver through improper servicing.

- All DC voltage to be measured with a tester (100kΩ/V). Voltage taken on a complex color bar signal including a standard color bar signal.
- Since this is a basic circuit diagram, the value of the parts is subject to be altered for improvement.

PRODUCT SAFETY NOTE: Components marked with a ⚠ and shaded have special characteristics important to safety. Before replacing any of these components, read carefully the PRODUCT SAFETY NOTICE of this Service Manual. Don't degrade the safety of the receiver through improper servicing.

BASIC CIRCUIT DIAGRAM

E

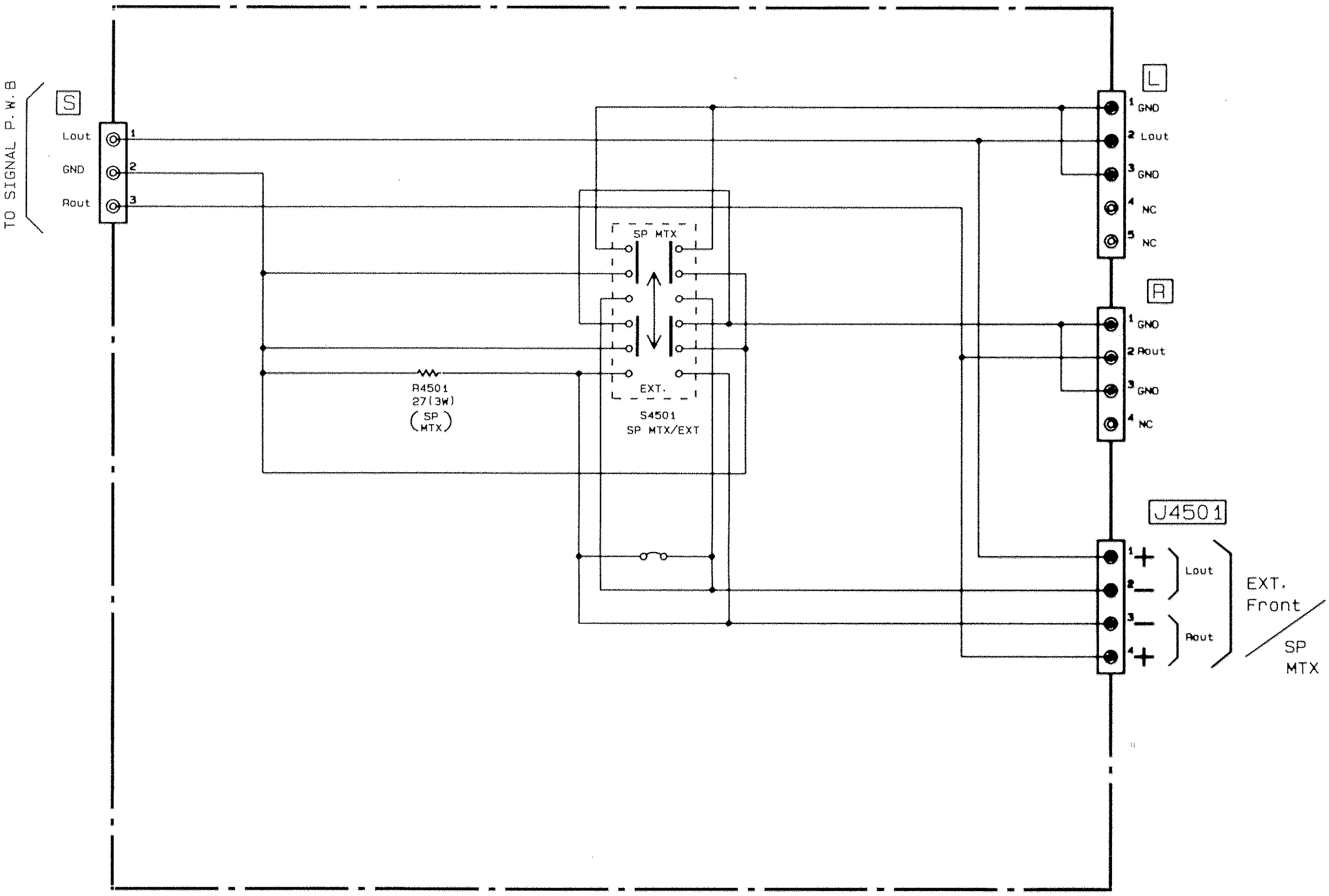


CX
GND
VIDEO IN
GND
Y OUT
GND
C OUT
GND
GND
+9V
+9V
TO SIGNAL P.W.B
R5001 220
R5002 820
Q5001
9.2V
4.5V
3.8V
R5003 1K
R5004 1K
DL5001 SBF4242
Q5002
3.8V
6.5V
3.1V
C5010 100/16 CE-M
R5006 100(1/4)
C5001 47/16 CE-M
R5008 1K
C5008 100/16 CE-M
R5005 680
C5003 100/16 CE-M
R5007 27K
C5002 10/16
R5009 1K
R5010 47K
R5011 100
R5012 560
Q5003
4.7V
3.8V
3.2V
R5013 1K
C5004 39P CCSL-J
DL5003 GLASS 63.5us
IN OUT
6.5V
4.7V
3.1V
3.2V
R5032 2.2K
R5033 220
L5001
PHASE1 ADJ.
C5005 0.01 MYL-K
R5015 1K-B
Gain1 ADJ.
R5034 560
R5016 560
Q5004
4.8V
3.1V
2.5V
R5017 820
C5006 82P CCCH-J
L5002 5.6u LAL
R5018 500-B
PHASE2 ADJ.
C5007 0.01 CK-K
R5022 2K-B
Gain2 ADJ.
Q5005
2.5V
4.2V
1.8V
R5019 1K
R5020 330
R5021 1K
C5009 100/16 CE-M
R5030 6.8K
R5031 4.7K
R5024 180
Q5006
5.8V
2.7V
2.0V
R5023 390
R5025 270
R5026 10K
Q5007
5.8V
6.5V
4.5V
2.5V
Q5008
3.9V
1.8V
R5028 1.2K
R5027 1.8K
Q5009
3.9V
6.5V
3.2V
R5029 2.2K

AP32 chassis
2LINE COMB P.W.B.
CIRCUIT DIAGRAM

- All DC voltage to be measured with a tester (100kΩ/V). Voltage taken on a complex color bar signal including a standard color bar signal.
- Since this is a [illegible] circuit diagram, the value of the parts is subjec [illegible] e altered for improvement.

BASIC CIRCUIT DIAGRAM



TO SIGNAL P.W.B
S
Lout
GND
Rout
1
2
3
R4501
27(3W)
(SP MTX)
SP MTX
EXT.
S4501
SP MTX/EXT
L
1 GND
2 Lout
3 GND
4 NC
5 NC
R
1 GND
2 Rout
3 GND
4 NC
J4501
1 +
2 −
3 −
4 +
Lout
Rout
EXT.
Front
SP
MTX

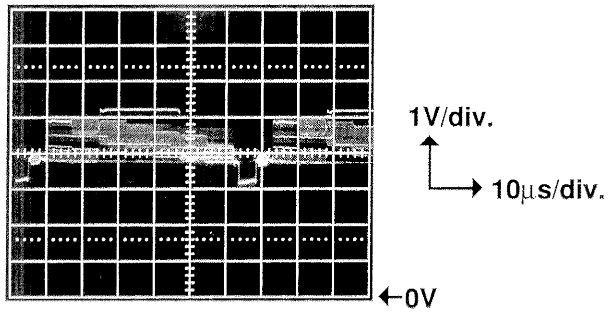
AP32 chassis
SP. TERMINAL P.W.B.
CIRCUIT DIAGRAM

PRODUCT SAFETY NOTE: Components marked with a ⚠ and shaded have special characteristics important to safety. Before replacing any of these components, read carefully the PRODUCT SAFETY NOTICE of this Service Manual. Don't degrade the safety of the receiver through improper servicing.

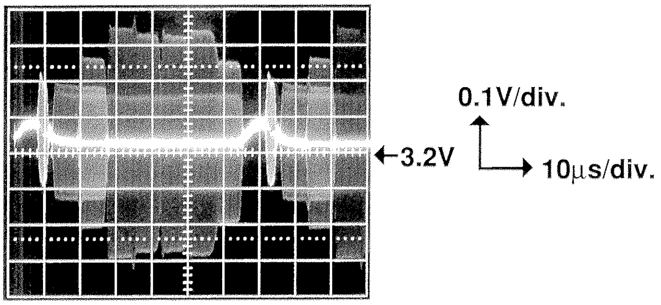
- All DC voltage to be measured with a tester (100kΩ/V). Voltage taken on a complex color bar signal including a standard color bar signal.
- Since this is a basic circuit diagram, the value of the parts is subject to be altered for improvement.

WAVEFORMS AT EACH SECTION

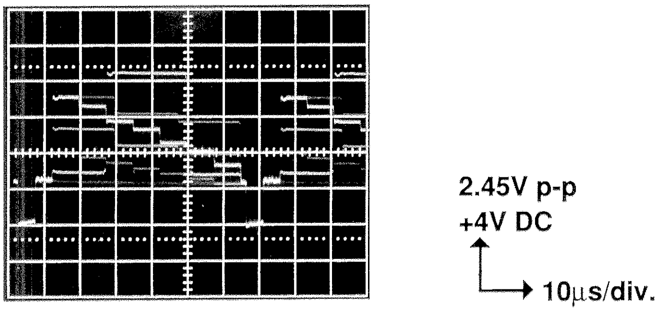
① CX-connector pin 2
(Video in)



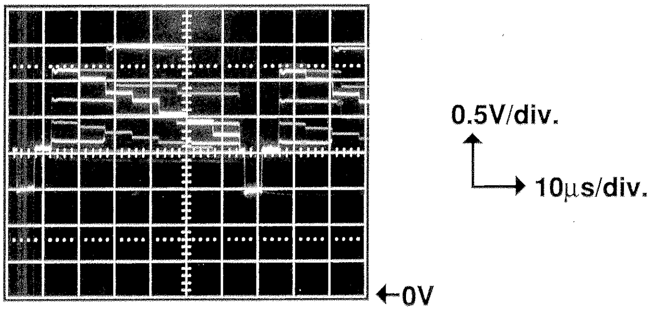
② CX-connector pin 6
(C-out)



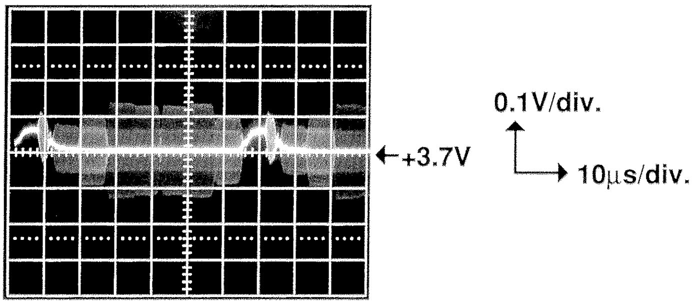
③ CX-connector pin 4
(Y-out)



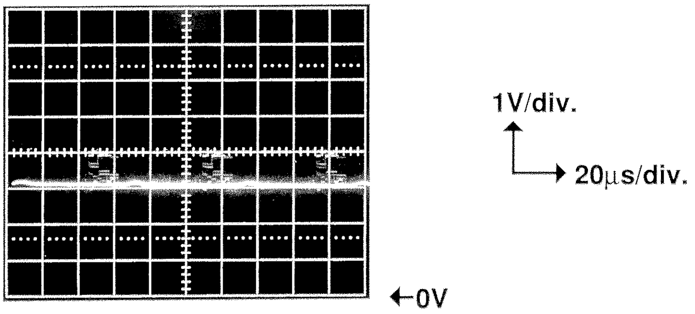
⑤ Q3503 Emitter
(Y-buffer)



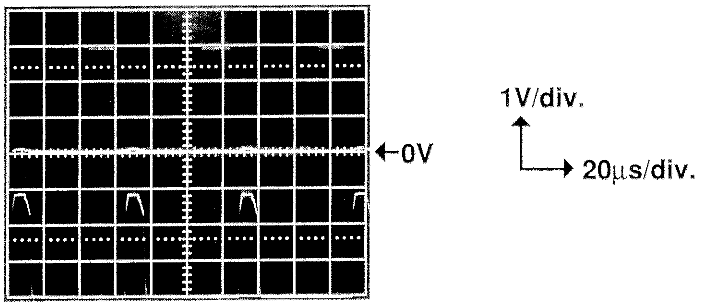
⑦ Q3504 emitter
(C-buffer)



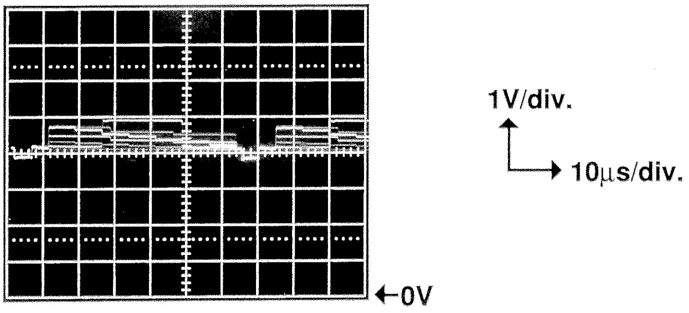
⑧ IC5501 pin 16
(GTX in, PinP on)



⑨ IC5501 pin 18
(Ys-PinP with H.Blk. reference)

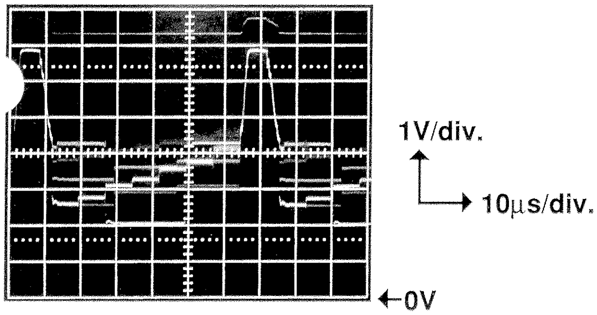


⑩ IC5501 pin 55
(Y-in)

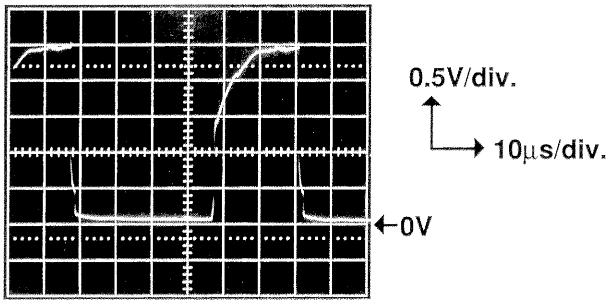


WAVEFORMS AT EACH SECTION

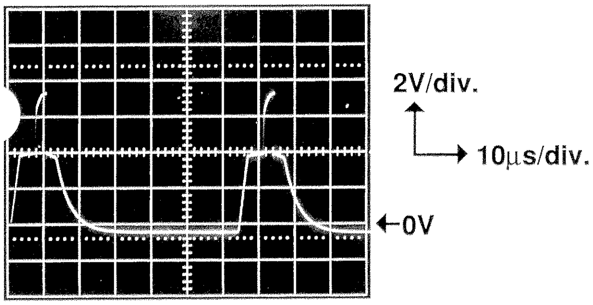
⑪ IC5501 pin 13
(-Y out)



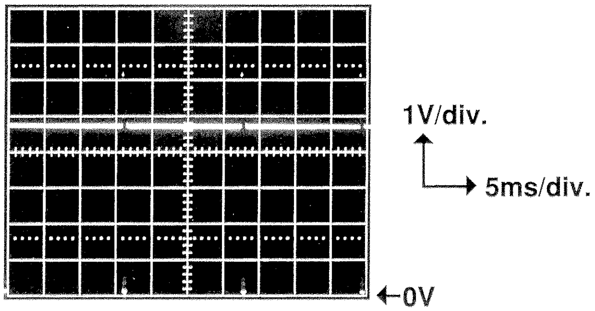
⑫ IC5501 pin 26
(H-out)



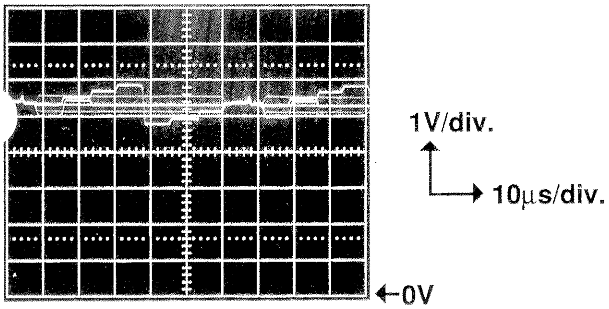
⑬ IC5501 pin 25
(FB Pin)



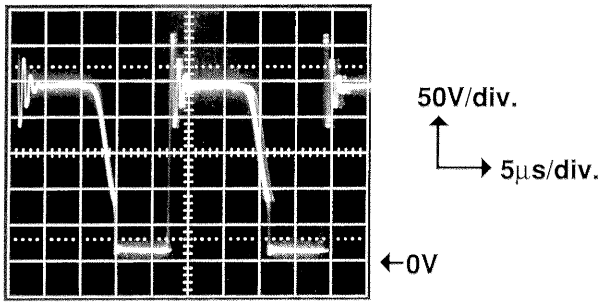
⑭ IC5501 pin 32
(V out)



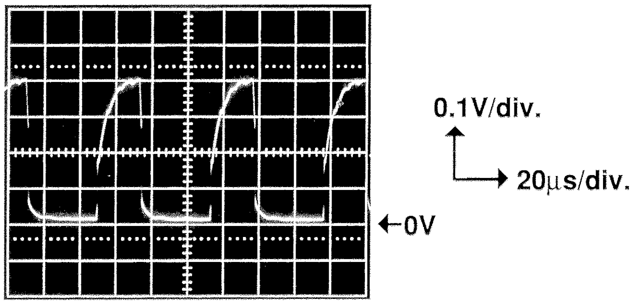
⑮ IC5501 pin 11
(G-Y out)



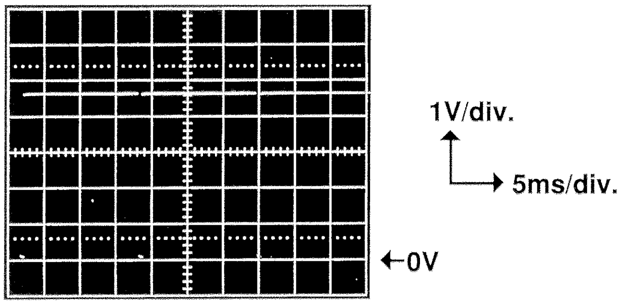
⑯ IC901 pin 1
(Switching Regulator Output)



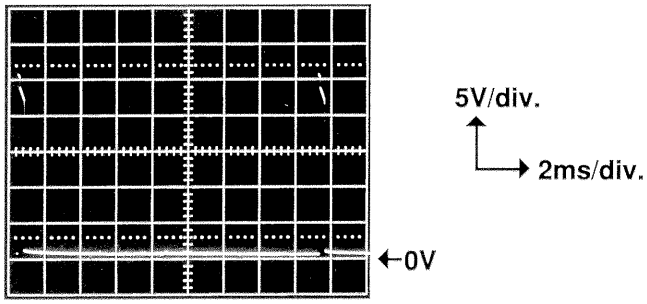
⑰ SD2 connector pin 5
(H. Drive)



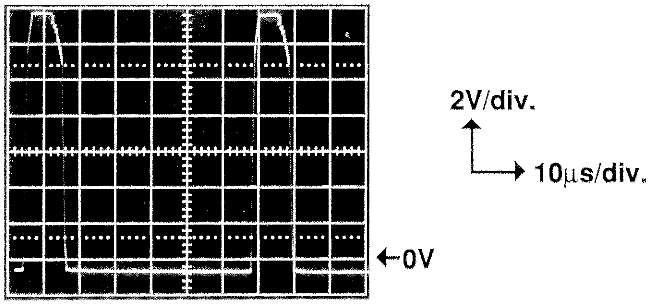
⑱ SD2 connector pin 9
(V. Drive)



⑲ SD2 connector pin 10
(V. Blanking)

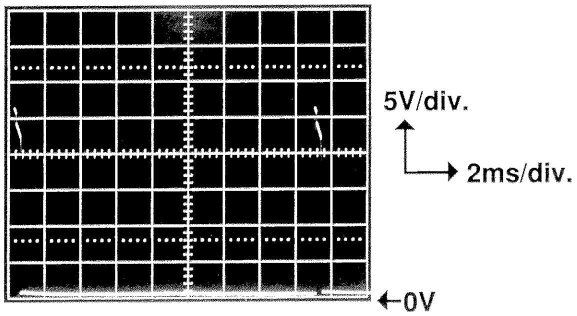


⑳ SD3 connector pin 2
(H. Blanking)

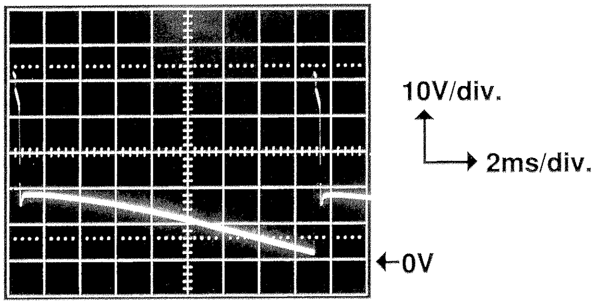


WAVEFORMS AT EACH SECTION

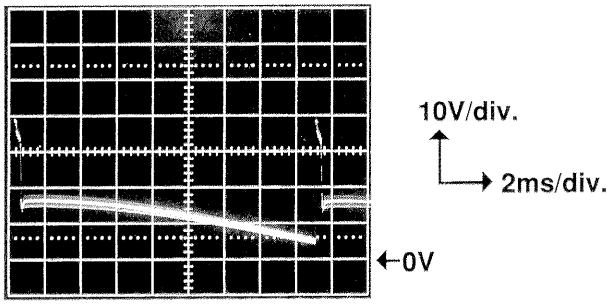
㉑ IC601 pin 9
(V. pump-up)



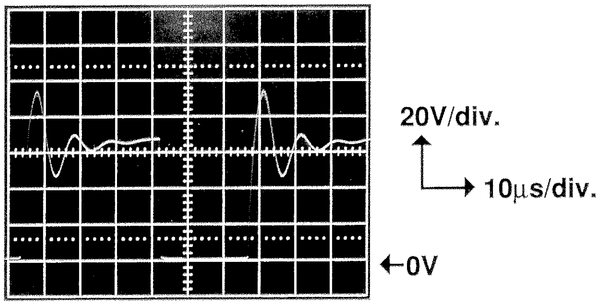
㉒ IC601 pin 12
(V.-out)



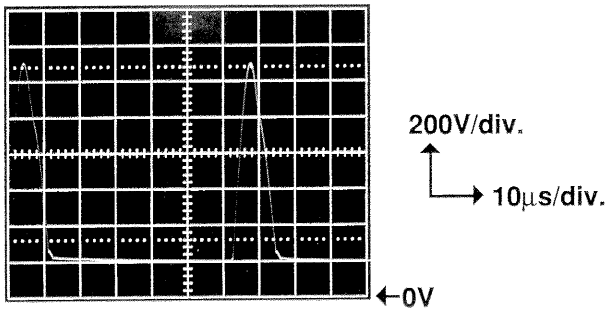
㉓ MB-connector pin 1
(V.DY-Blue)



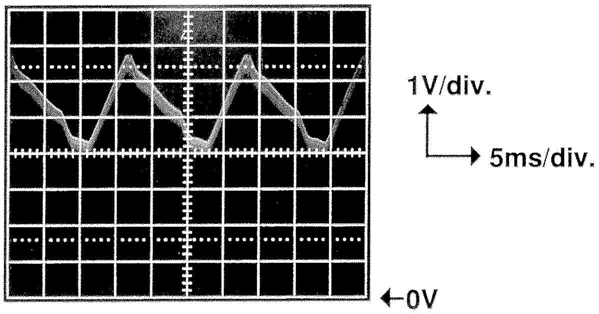
㉔ Q701 Collector
(H. Drive)



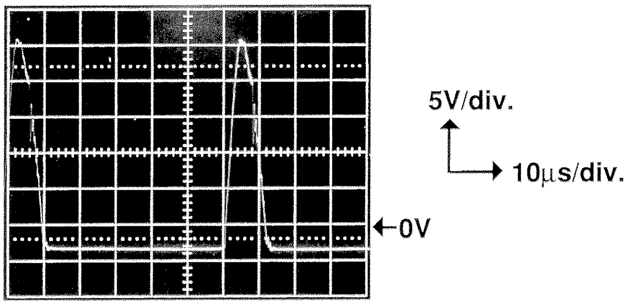
㉕ Q777 Collector
(H. Output)



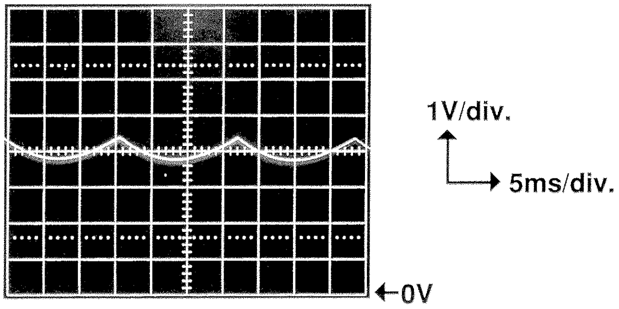
㉖ Q710 Collector



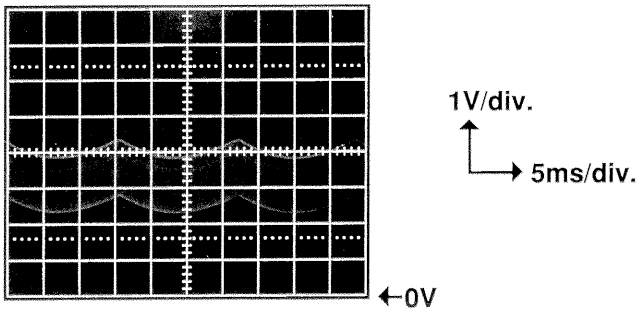
㉗ FBT pin H
(CPT Heater)



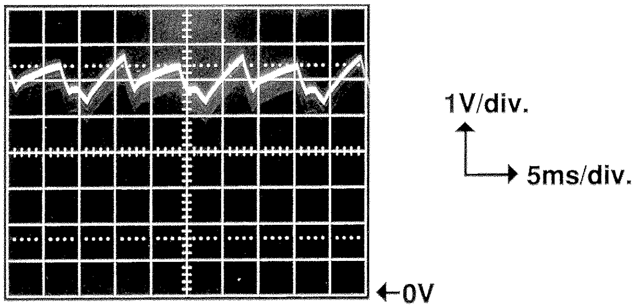
㉘ Q609 Base



㉙ Q717 Base

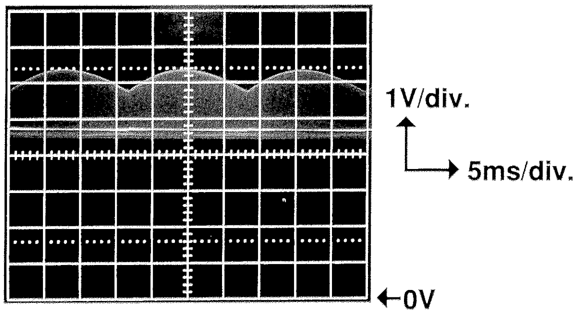


㉚ Q712 Base

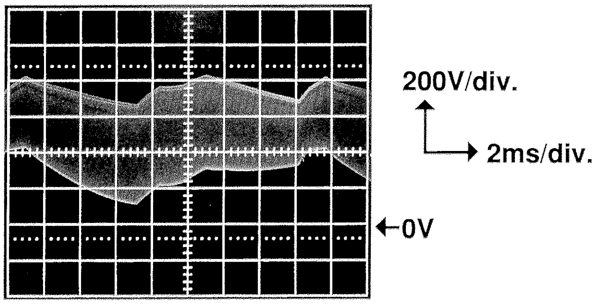


WAVEFORMS AT EACH SECTION

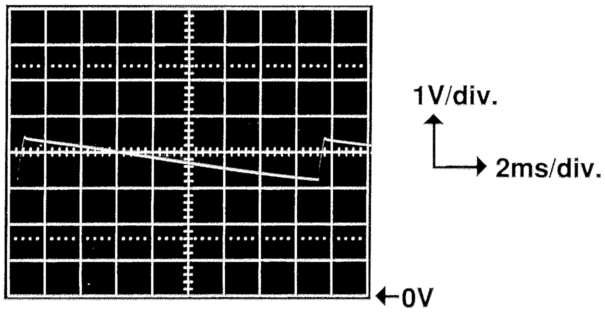
㉛ Q711 Emitter



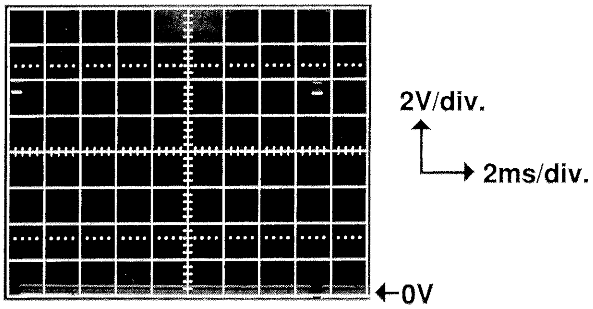
㉜ Q780 Collector
(Dynamic Focus)



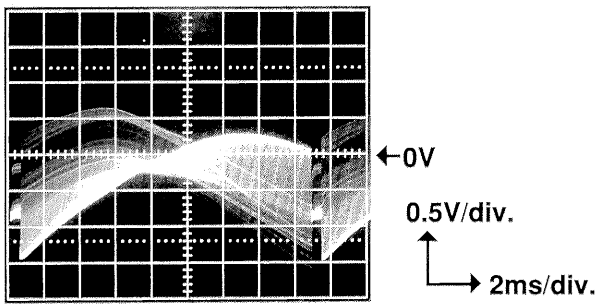
㉝ Q607 Base



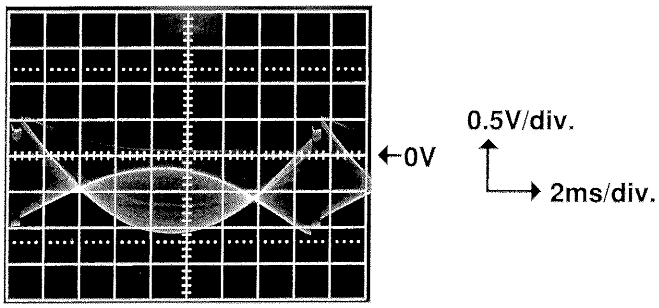
㉞ RR connector pin 4
(V Drive)



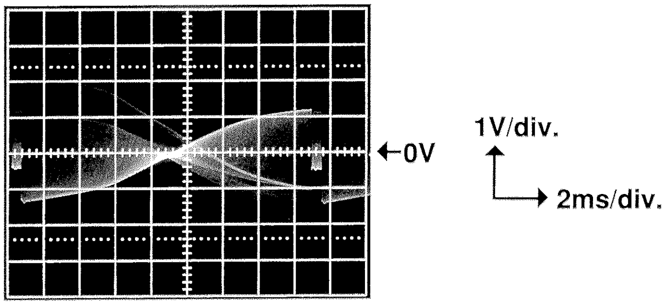
㉟ IC1351 pin 14
(BV-)



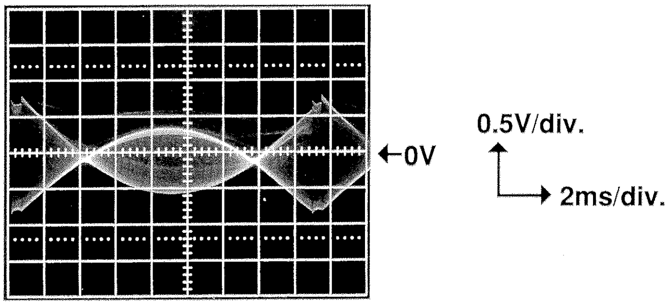
㊱ IC1351 pin 1
(BH+)



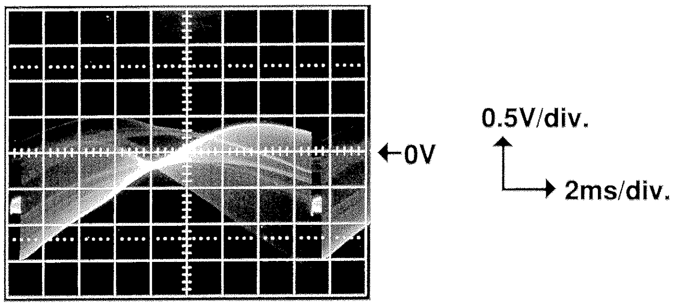
㊲ IC1326 pin 15
(GV+)



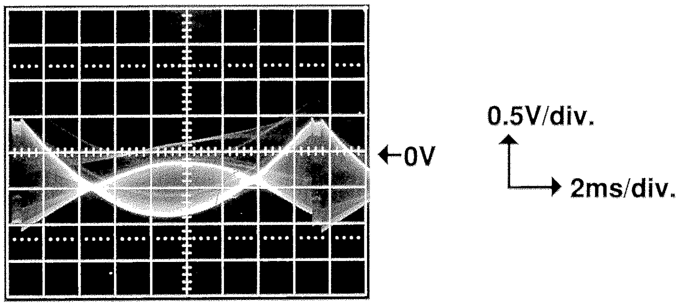
㊳ IC1326 pin 1
(GH+)



㊴ IC1301 pin 15
(RV+)

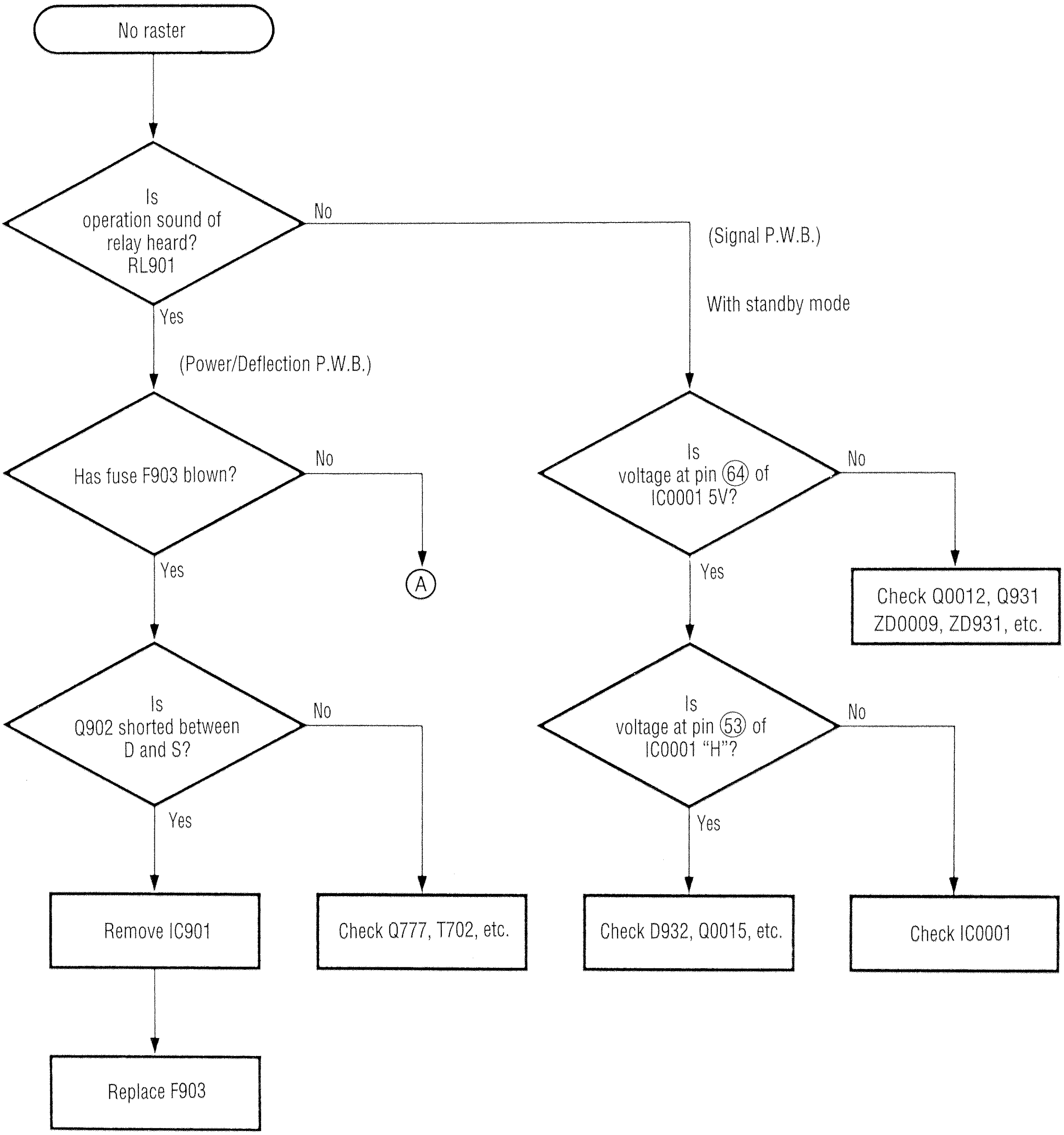


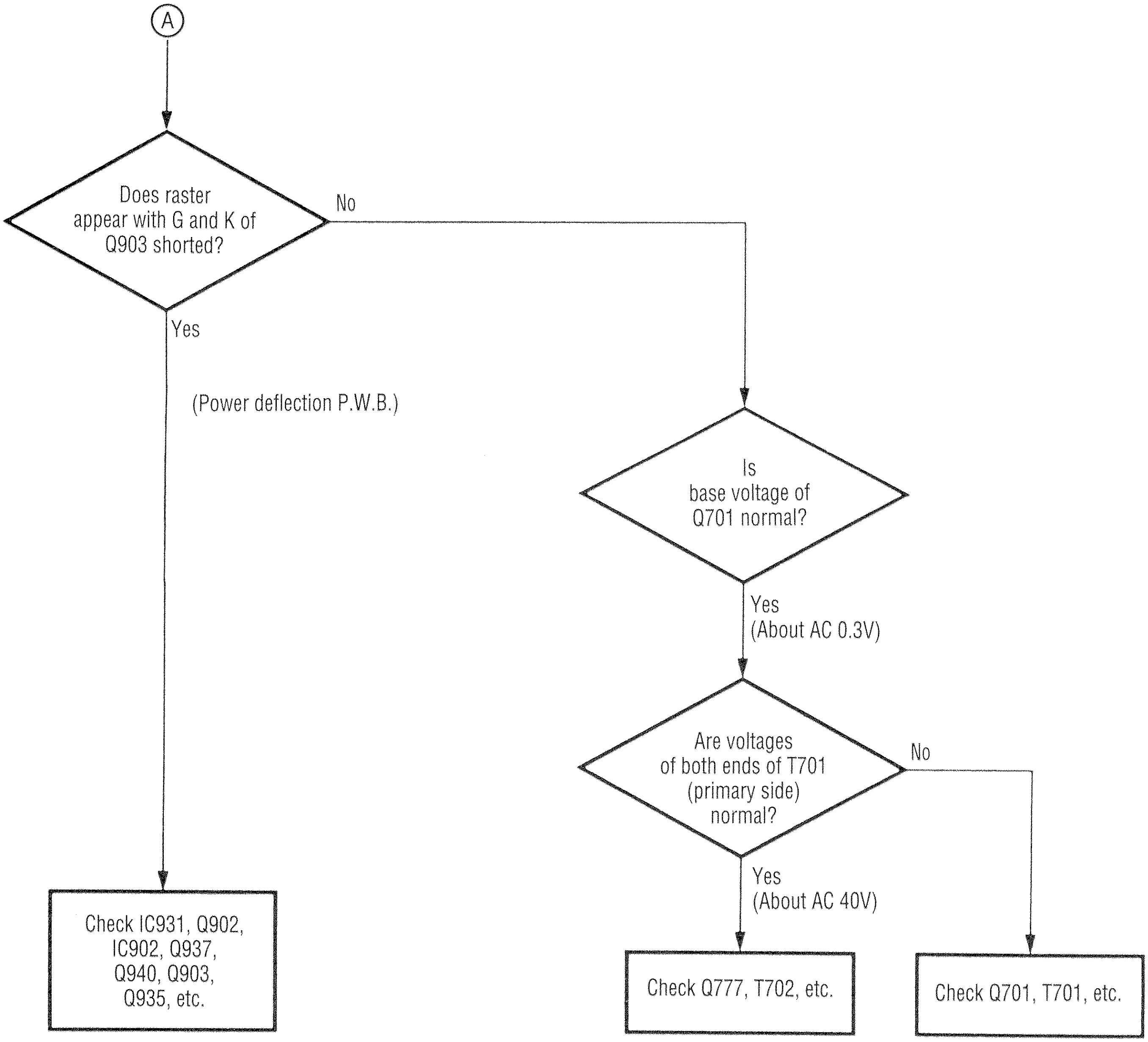
㊵ IC1301 pin 1
(RH+)



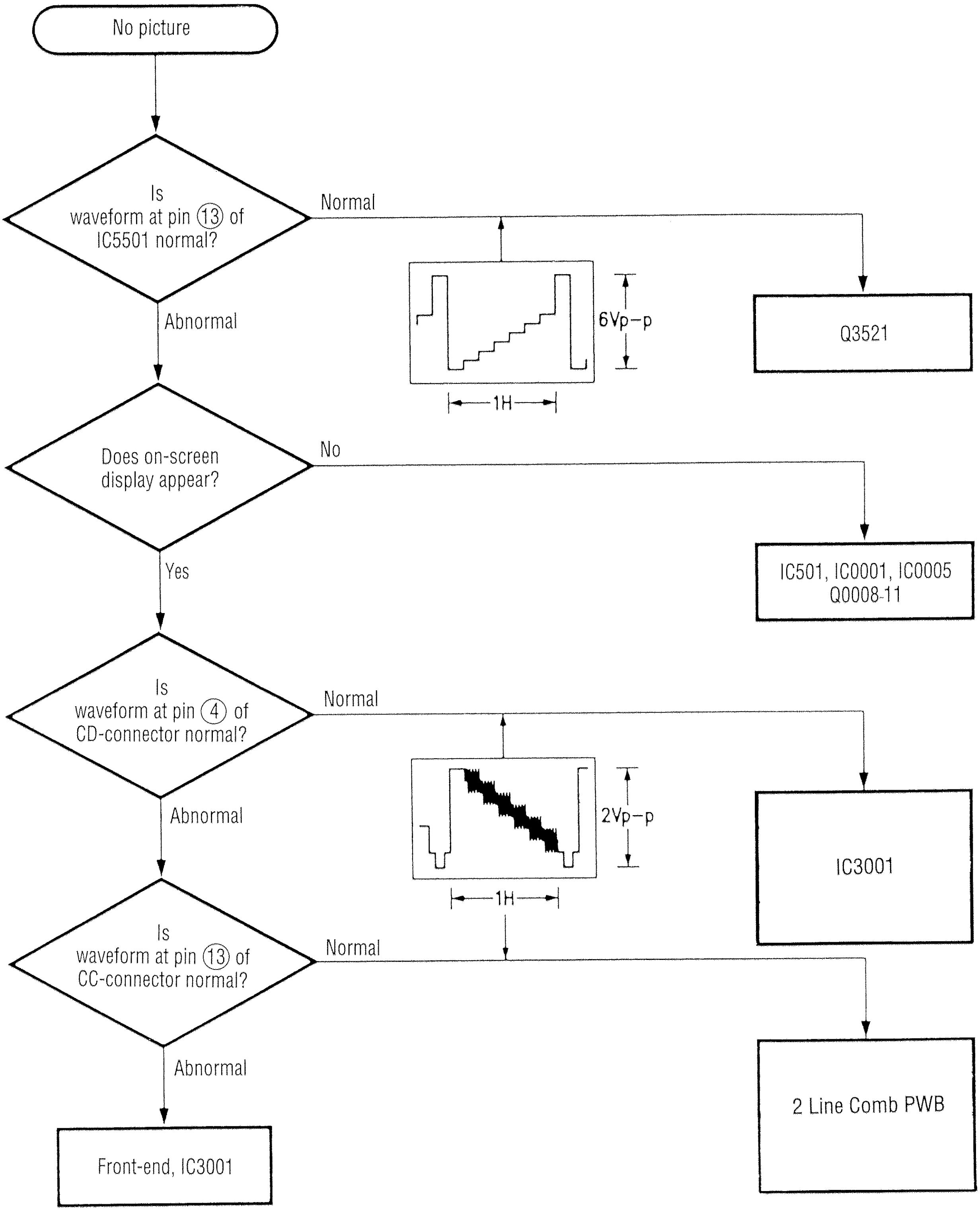
TROUBLESHOOTING

1. No raster

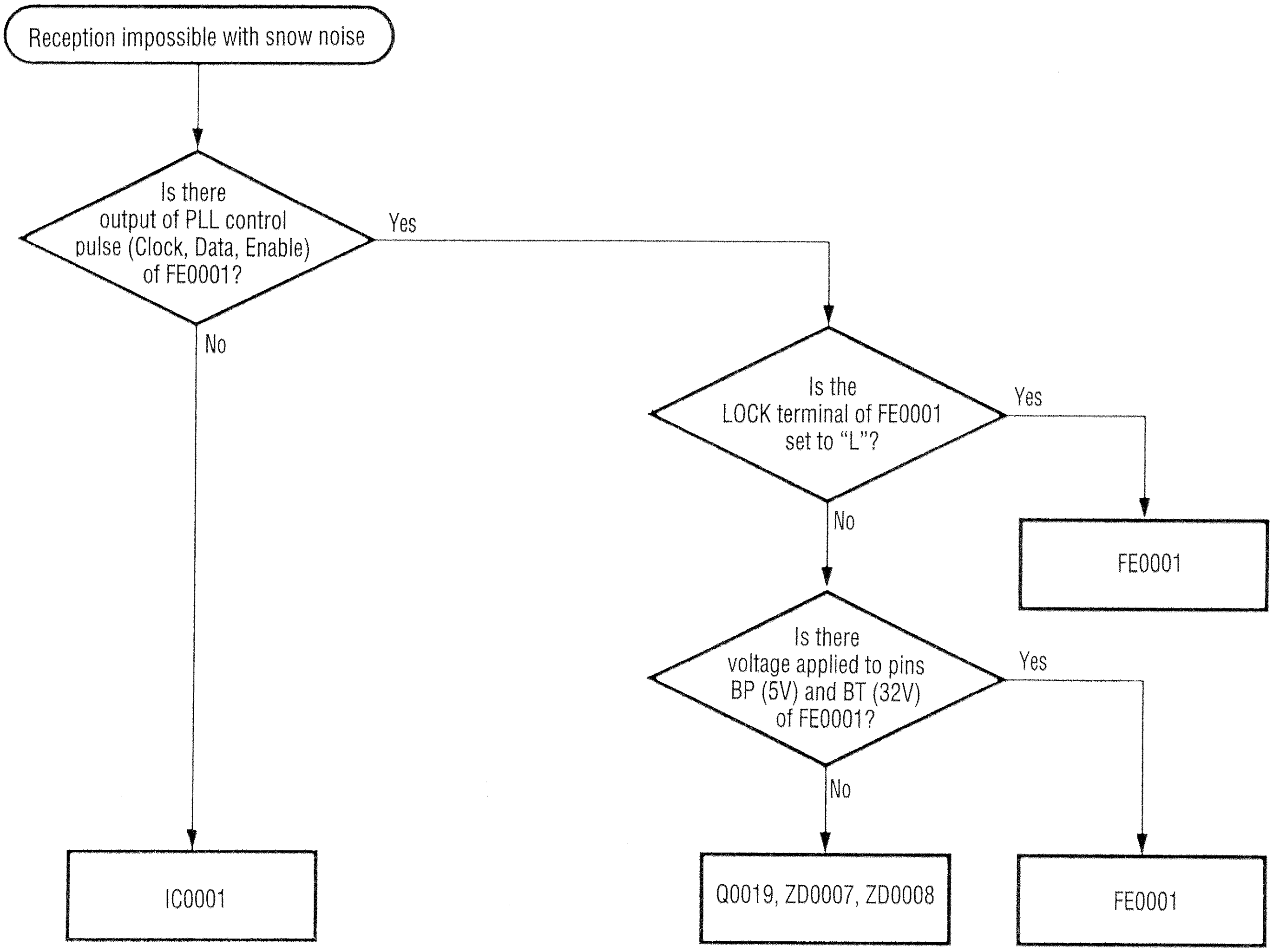

No raster
Is operation sound of relay heard? RL901
No
Yes
(Power/Deflection P.W.B.)
(Signal P.W.B.)
With standby mode
Has fuse F903 blown?
No
Yes
A
Is Q902 shorted between D and S?
No
Yes
Remove IC901
Replace F903
Check Q777, T702, etc.
Is voltage at pin ⑥④ of IC0001 5V?
No
Yes
Check Q0012, Q931 ZD0009, ZD931, etc.
Is voltage at pin ⑤③ of IC0001 "H"?
No
Yes
Check D932, Q0015, etc.
Check IC0001


A
Does raster appear with G and K of Q903 shorted?
No
Yes
(Power deflection P.W.B.)
Is base voltage of Q701 normal?
Yes
(About AC 0.3V)
Are voltages of both ends of T701 (primary side) normal?
No
Yes
(About AC 40V)
Check IC931, Q902, IC902, Q937, Q940, Q903, Q935, etc.
Check Q777, T702, etc.
Check Q701, T701, etc.

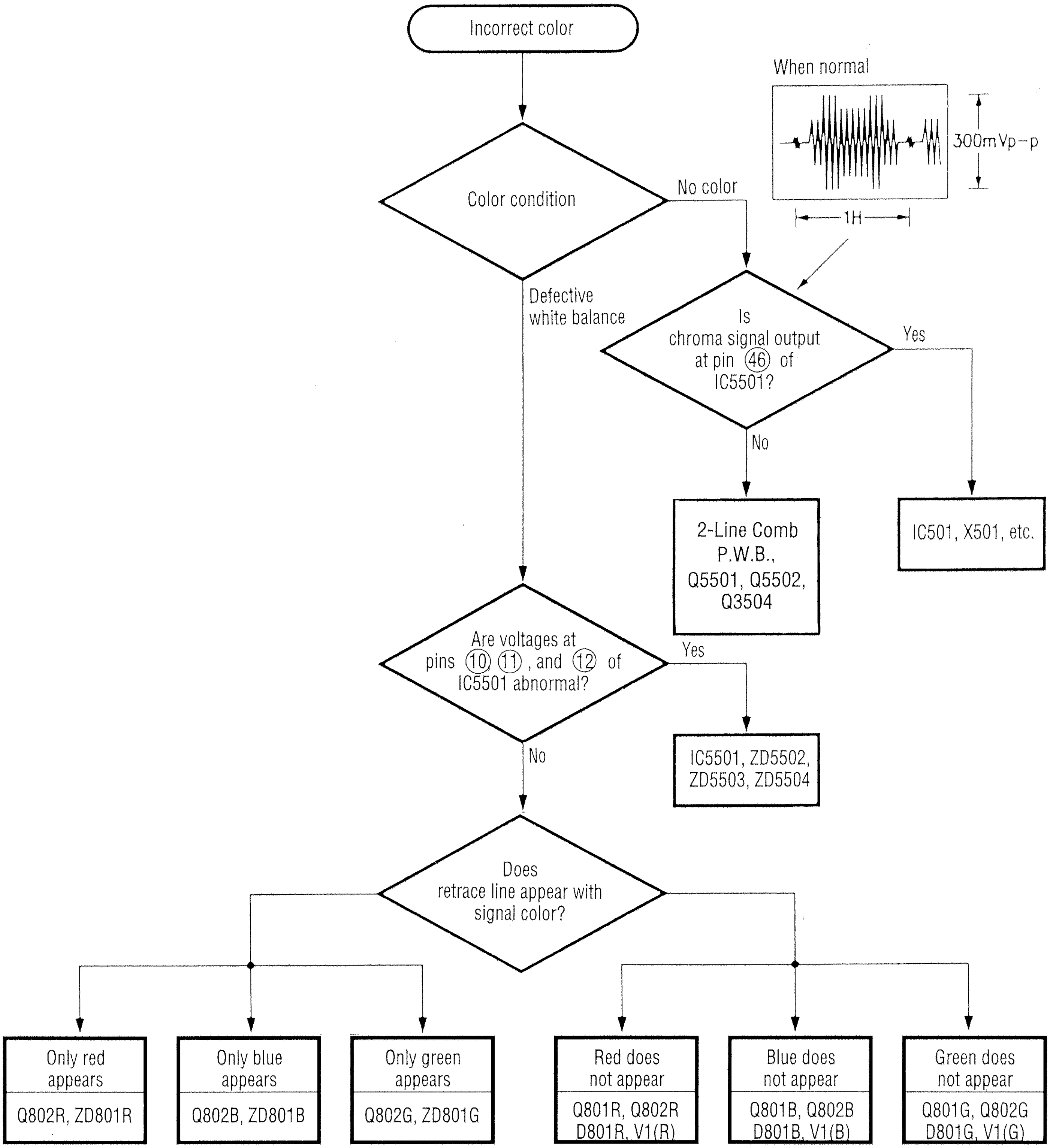
2. No picture


No picture
Is waveform at pin ⑬ of IC5501 normal?
Normal
Abnormal
6Vp−p
1H
Q3521
Does on-screen display appear?
No
Yes
IC501, IC0001, IC0005
Q0008-11
Is waveform at pin ④ of CD-connector normal?
Normal
Abnormal
2Vp−p
1H
IC3001
Is waveform at pin ⑬ of CC-connector normal?
Normal
Abnormal
2 Line Comb PWB
Front-end, IC3001

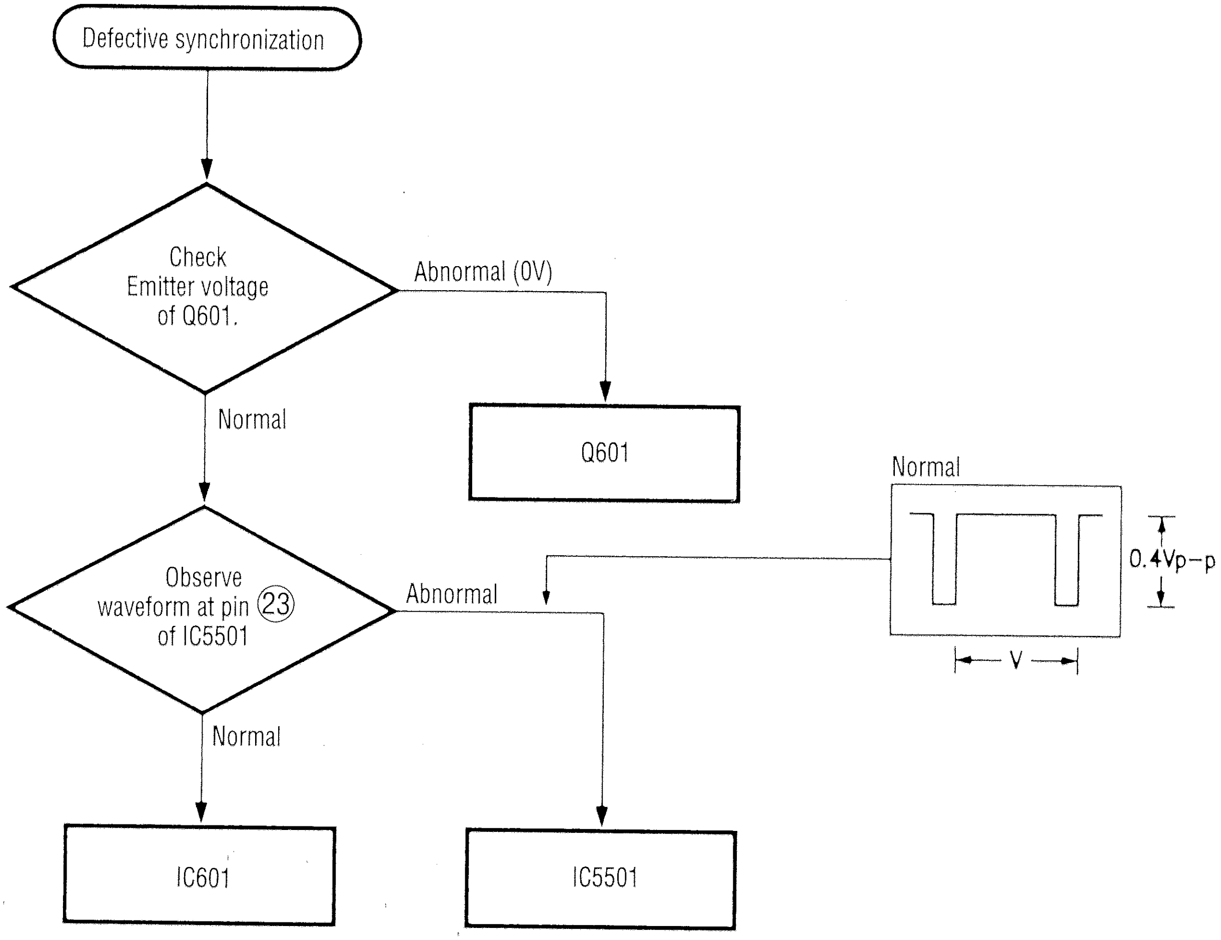
3. Reception impossible with snow noise


Reception impossible with snow noise
Is there output of PLL control pulse (Clock, Data, Enable) of FE0001?
Yes
No
Is the LOCK terminal of FE0001 set to "L"?
Yes
No
FE0001
Is there voltage applied to pins BP (5V) and BT (32V) of FE0001?
Yes
No
IC0001
Q0019, ZD0007, ZD0008
FE0001

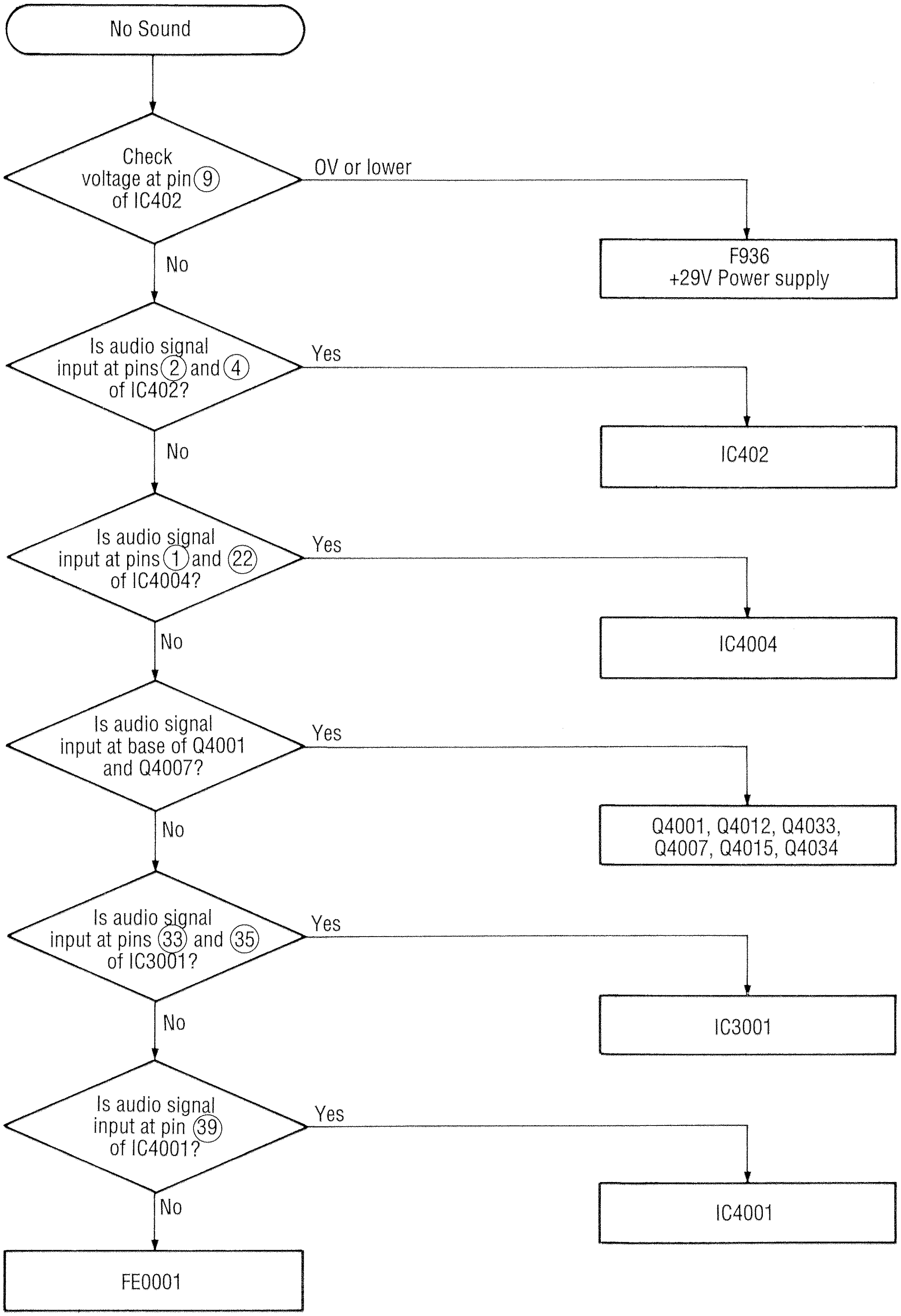
4. Incorrect color


Incorrect color
Color condition
No color
When normal
300mVp-p
1H
Is chroma signal output at pin ㊻ of IC5501?
Yes
IC501, X501, etc.
No
2-Line Comb P.W.B., Q5501, Q5502, Q3504
Defective white balance
Are voltages at pins ⑩ ⑪, and ⑫ of IC5501 abnormal?
Yes
IC5501, ZD5502, ZD5503, ZD5504
No
Does retrace line appear with signal color?
Only red appears
Q802R, ZD801R
Only blue appears
Q802B, ZD801B
Only green appears
Q802G, ZD801G
Red does not appear
Q801R, Q802R D801R, V1(R)
Blue does not appear
Q801B, Q802B D801B, V1(B)
Green does not appear
Q801G, Q802G D801G, V1(G)

5. Defective synchronization


Defective synchronization
Check
Emitter voltage
of Q601.
Abnormal (0V)
Q601
Normal
Observe
waveform at pin ㉓
of IC5501
Abnormal
Normal
0.4Vp-p
V
Normal
IC601
IC5501

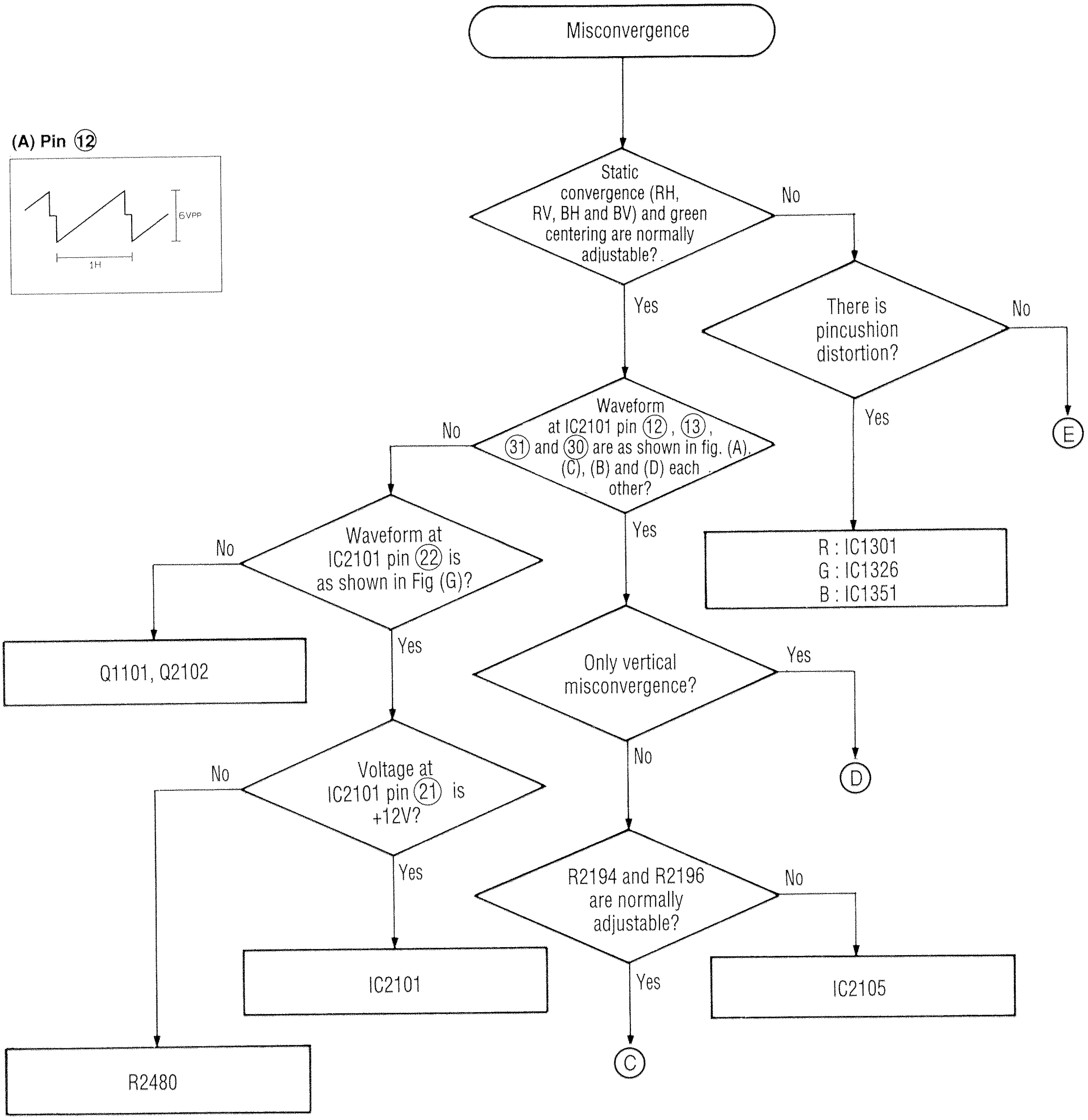
6.2 No sound


No Sound
Check voltage at pin ⑨ of IC402
0V or lower
F936 +29V Power supply
No
Is audio signal input at pins ② and ④ of IC402?
Yes
IC402
No
Is audio signal input at pins ① and ㉒ of IC4004?
Yes
IC4004
No
Is audio signal input at base of Q4001 and Q4007?
Yes
Q4001, Q4012, Q4033, Q4007, Q4015, Q4034
No
Is audio signal input at pins ㉝ and ㉟ of IC3001?
Yes
IC3001
No
Is audio signal input at pin ㊴ of IC4001?
Yes
IC4001
No
FE0001

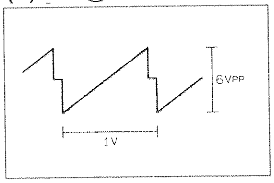
7. Misconvergence

(A) Pin ⑫

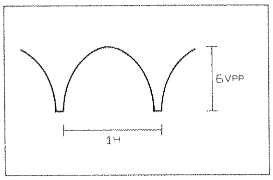
6VPP
1H


Misconvergence
Static convergence (RH, RV, BH and BV) and green centering are normally adjustable?
No
There is pincushion distortion?
No
E
Yes
R : IC1301
G : IC1326
B : IC1351
Yes
Waveform at IC2101 pin ⑫, ⑬, ㉛ and ㉚ are as shown in fig. (A), (C), (B) and (D) each other?
No
Waveform at IC2101 pin ㉒ is as shown in Fig (G)?
No
Q1101, Q2102
Yes
Voltage at IC2101 pin ㉑ is +12V?
No
R2480
Yes
IC2101
Yes
Only vertical misconvergence?
Yes
D
No
R2194 and R2196 are normally adjustable?
No
IC2105
Yes
C

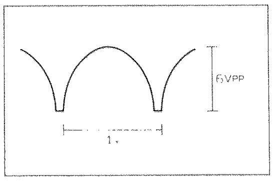
(B) Pin ㉛

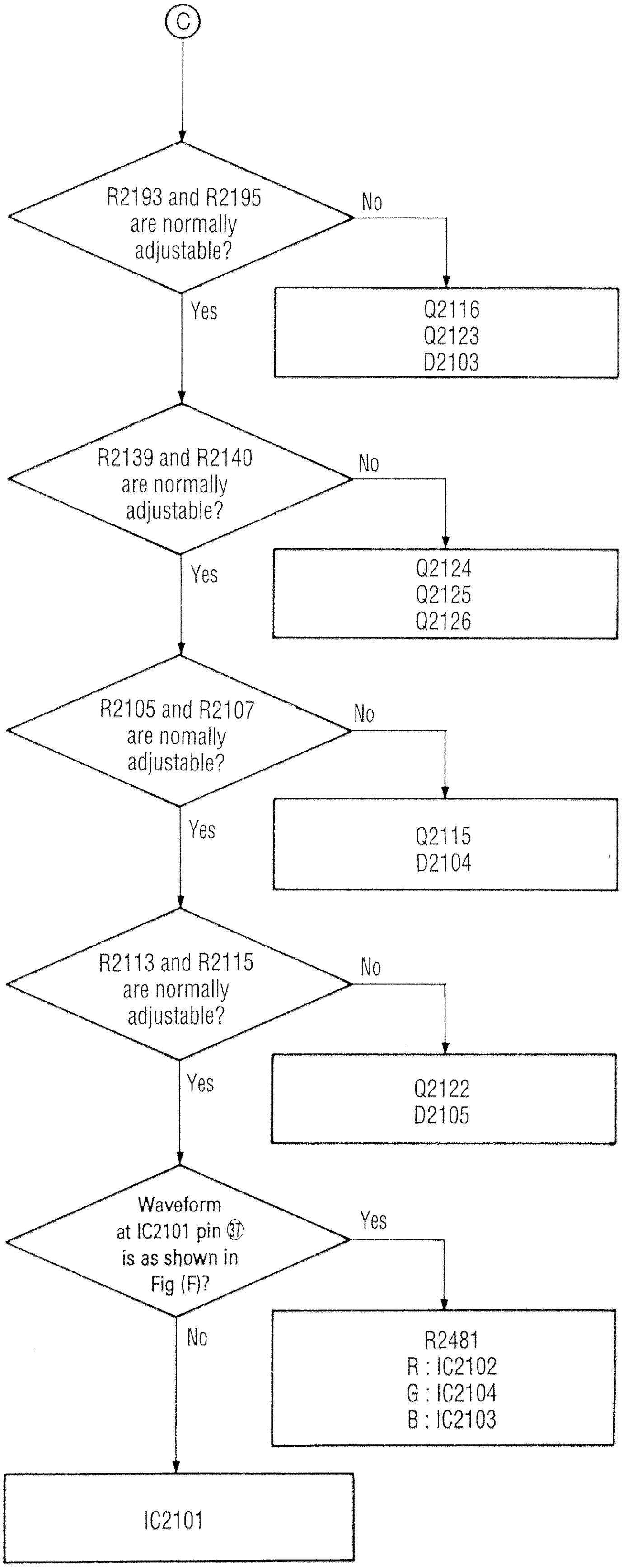


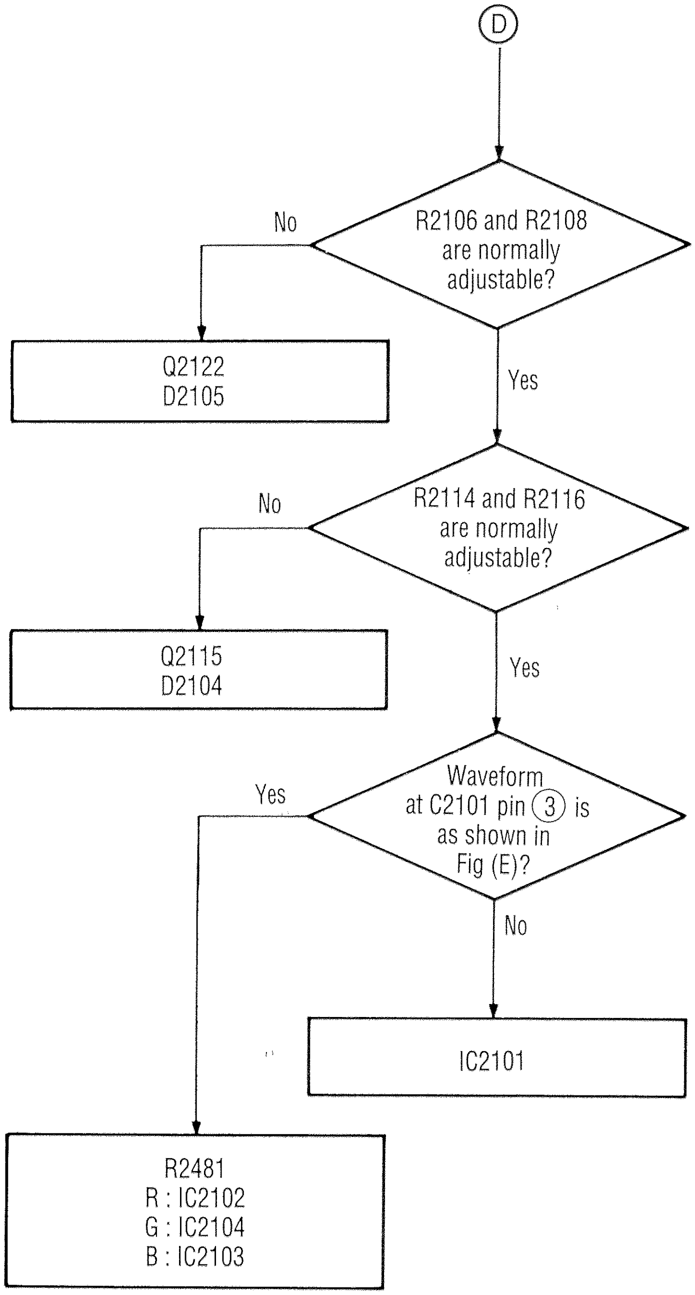
(C) Pin ⑬

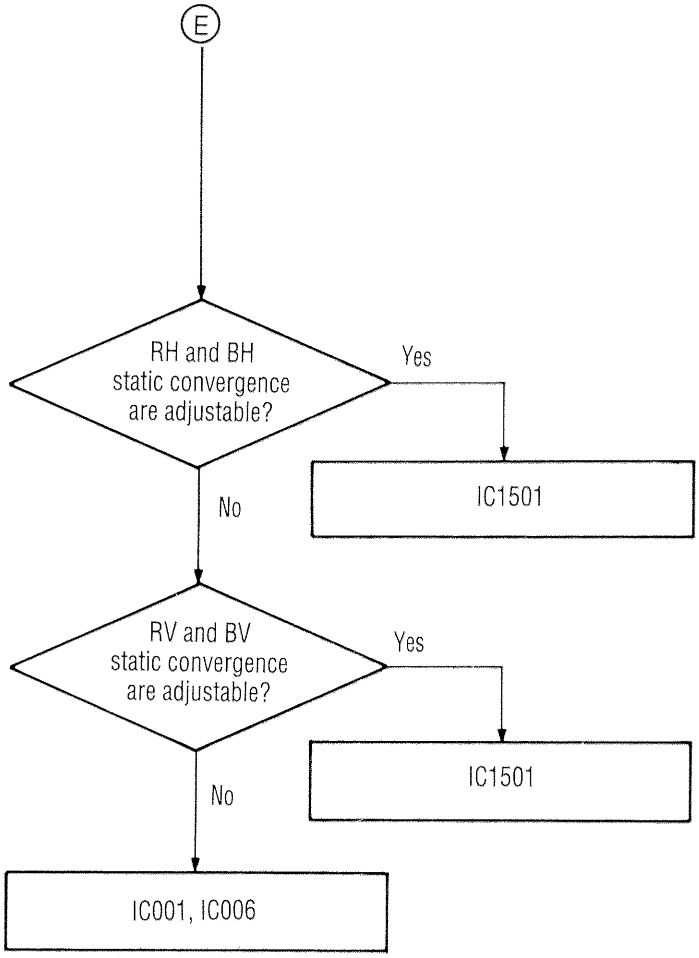


(D) Pin ㉚

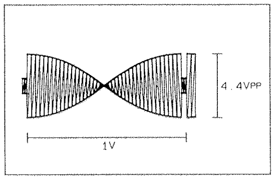



C
R2193 and R2195 are normally adjustable?
No
Q2116
Q2123
D2103
Yes
R2139 and R2140 are normally adjustable?
No
Q2124
Q2125
Q2126
Yes
R2105 and R2107 are nomally adjustable?
No
Q2115
D2104
Yes
R2113 and R2115 are normally adjustable?
No
Q2122
D2105
Yes
Waveform at IC2101 pin ㊲ is as shown in Fig (F)?
Yes
R2481
R : IC2102
G : IC2104
B : IC2103
No
IC2101

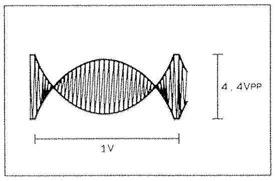

D
R2106 and R2108 are normally adjustable?
No
Q2122
D2105
Yes
R2114 and R2116 are normally adjustable?
No
Q2115
D2104
Yes
Waveform at C2101 pin ③ is as shown in Fig (E)?
Yes
R2481
R : IC2102
G : IC2104
B : IC2103
No
IC2101


E
RH and BH static convergence are adjustable?
Yes
IC1501
No
RV and BV static convergence are adjustable?
Yes
IC1501
No
IC001, IC006

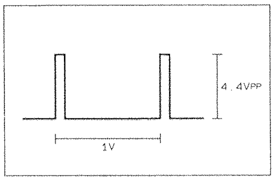
(E) Pin ③



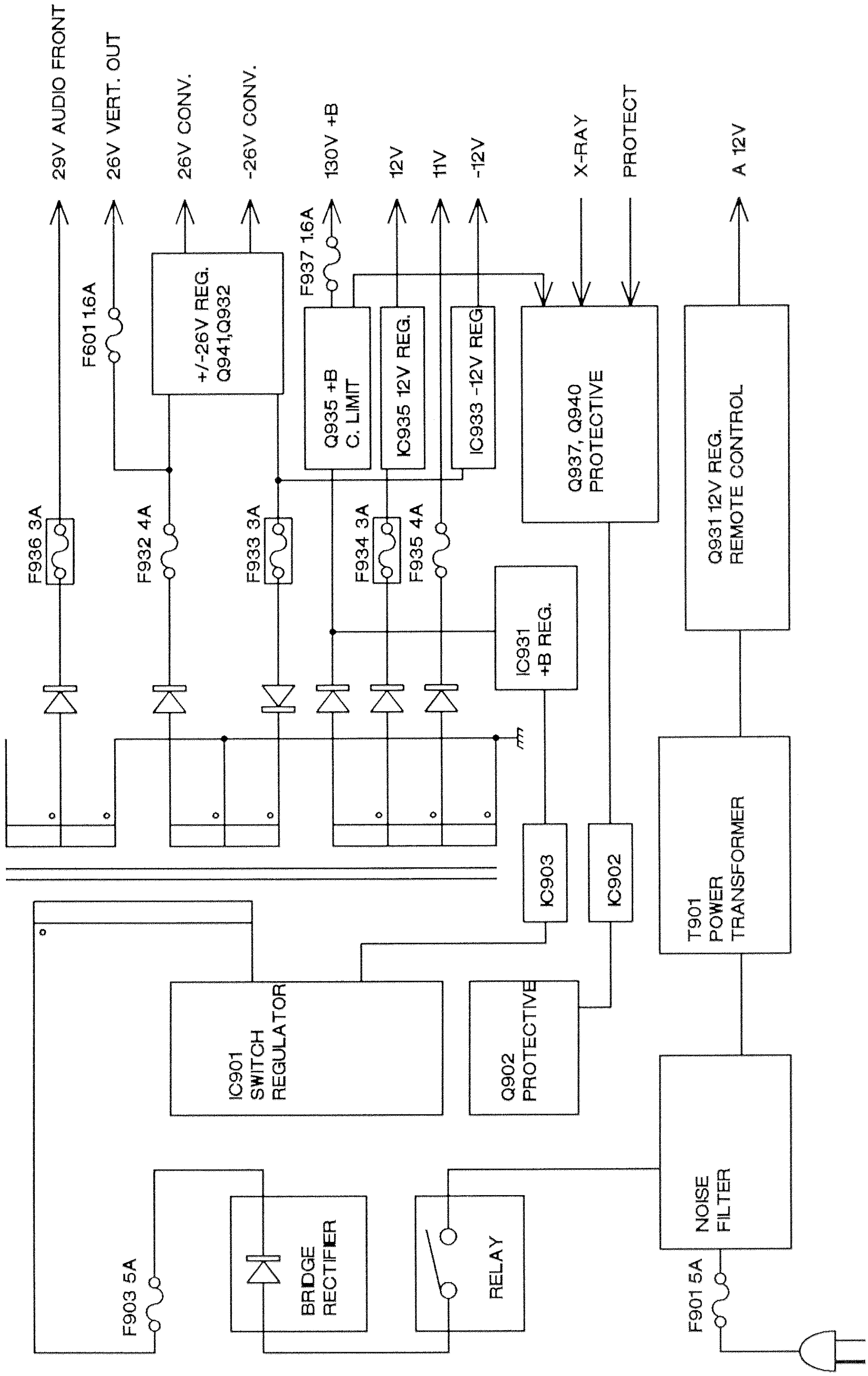
(F) Pin ㊲



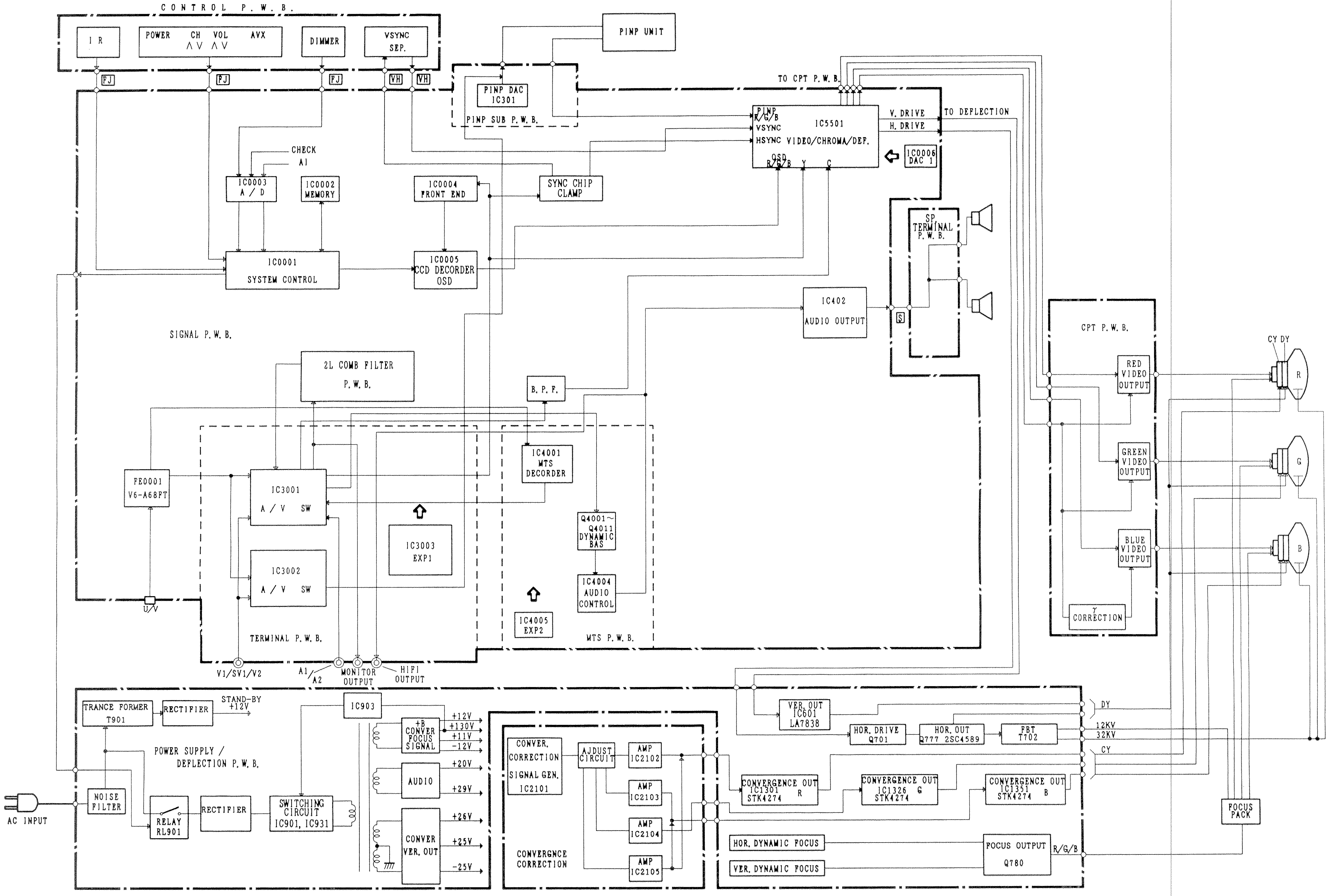
(G) Pin ㉒



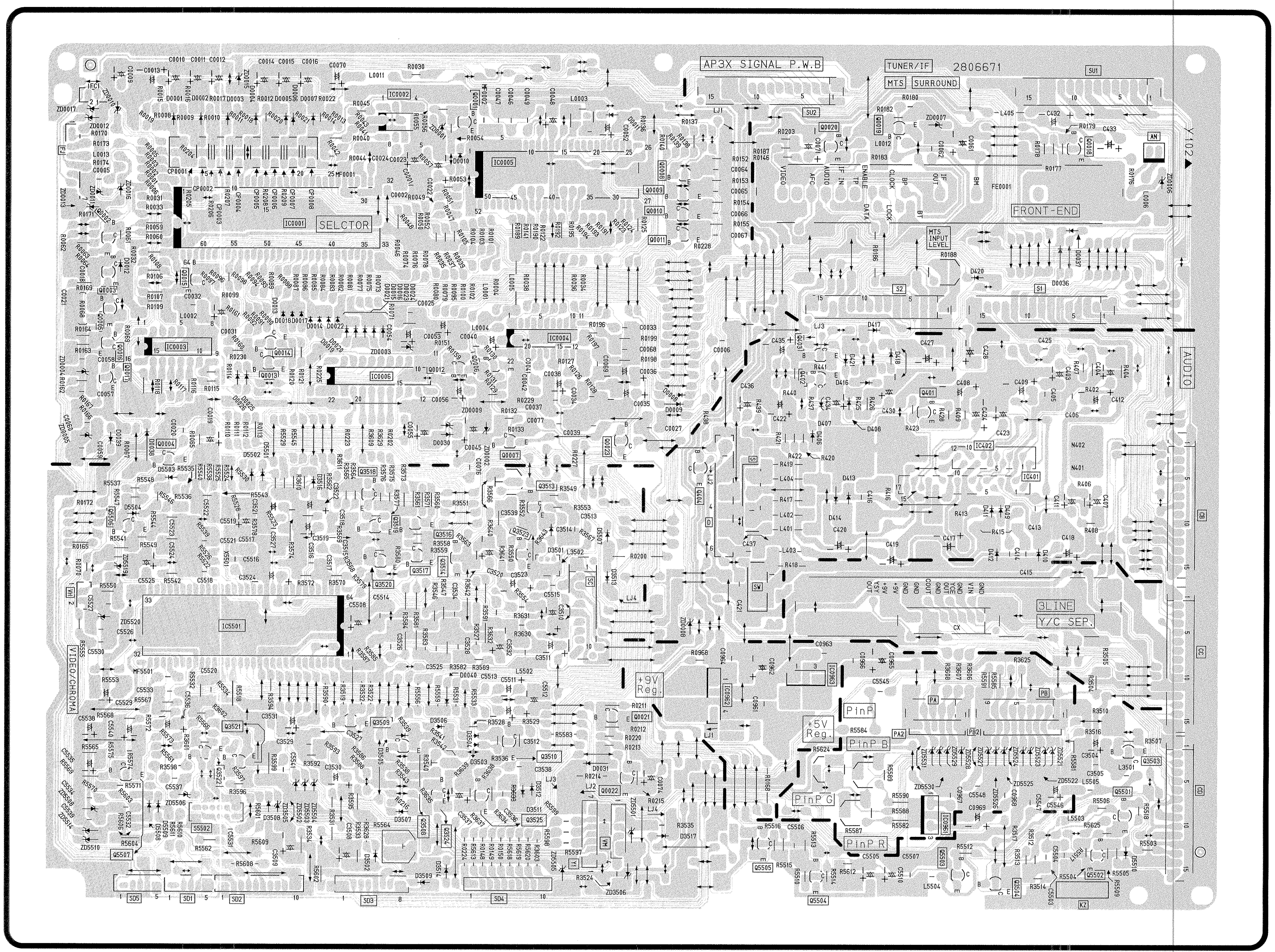
PROTECTION CIRCUIT BLOCK DIAGRAM


29V AUDIO FRONT
26V VERT. OUT
26V CONV.
-26V CONV.
130V +B
12V
11V
-12V
X-RAY
PROTECT
A 12V
F601 1.6A
+/-26V REG.
Q941,Q932
F937 1.6A
Q935 +B
C. LIMIT
IC935 12V REG.
IC933 -12V REG
Q937, Q940
PROTECTIVE
Q931 12V REG.
REMOTE CONTROL
F936 3A
F932 4A
F933 3A
F934 3A
F935 4A
IC931
+B REG.
IC903
IC902
T901
POWER
TRANSFORMER
IC901
SWITCH
REGULATOR
Q902
PROTECTIVE
NOISE
FILTER
F903 5A
BRIDGE
RECTIFIER
RELAY
F901 5A

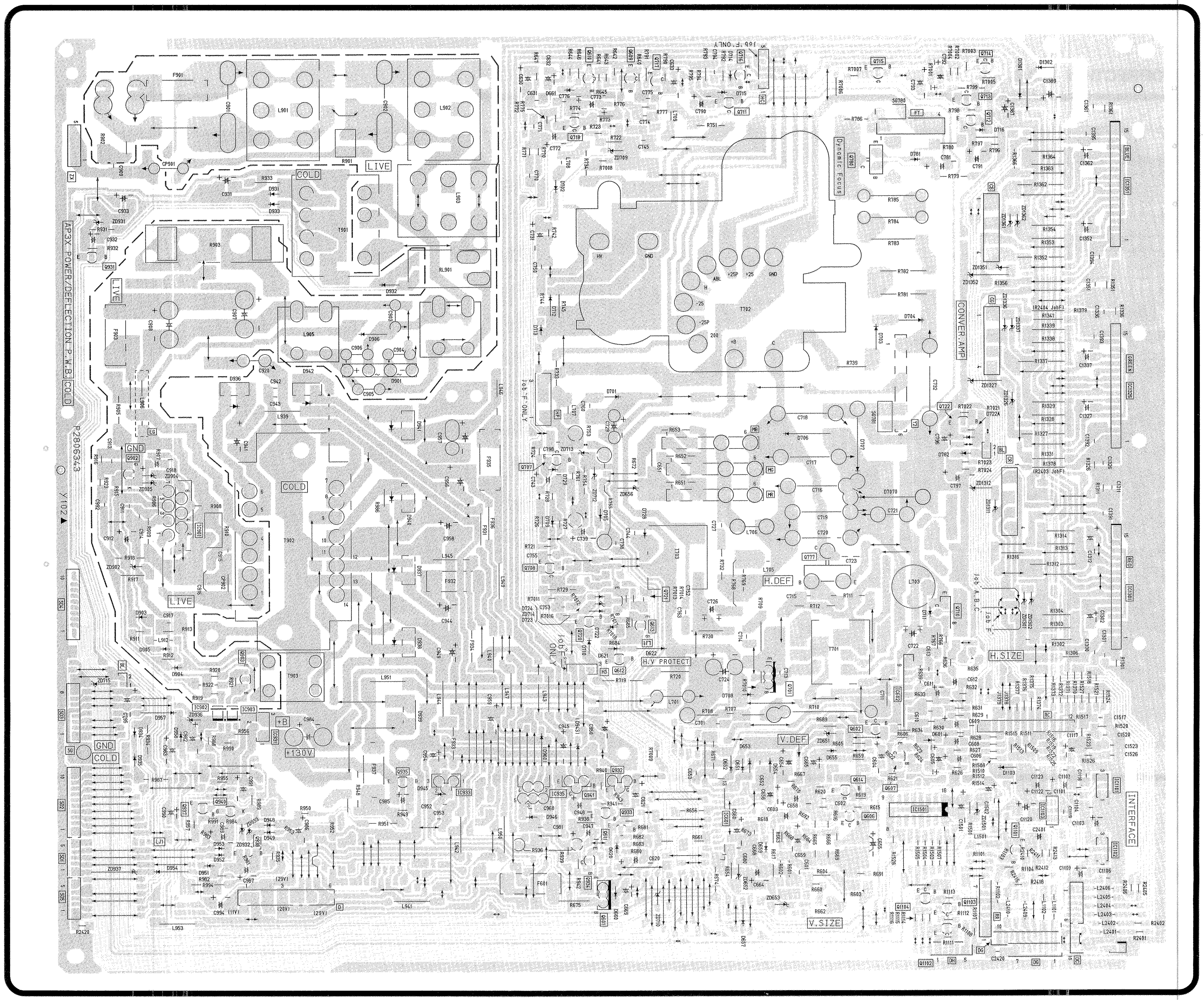
AP32 BLOCK DIAGRAM


CONTROL P. W. B.
I R
POWER
CH ∧ ∨
VOL ∧ ∨
AVX
DIMMER
VSYNC SEP.
FJ
FJ
FJ
VH
VH
PINP UNIT
PINP DAC IC301
PINP SUB P. W. B.
TO CPT P. W. B.
PINP R/G/B
VSYNC
HSYNC
IC5501 VIDEO/CHROMA/DEF.
OSD R/G/B
Y
C
V. DRIVE
H. DRIVE
TO DEFLECTION
IC0006 DAC 1
CHECK
AI
IC0003 A / D
IC0002 MEMORY
IC0004 FRONT END
SYNC CHIP CLAMP
IC0001 SYSTEM CONTROL
IC0005 CCD DECORDER OSD
SP TERMINAL P. W. B.
IC402 AUDIO OUTPUT
S
SIGNAL P. W. B.
2L COMB FILTER P. W. B.
B. P. F.
CPT P. W. B.
RED VIDEO OUTPUT
GREEN VIDEO OUTPUT
BLUE VIDEO OUTPUT
γ CORRECTION
CY DY
R
G
B
FE0001 V6-A68FT
IC3001 A / V SW
IC3002 A / V SW
IC3003 EXP1
IC4001 MTS DECORDER
Q4001~Q4011 DYNAMIC BAS
IC4004 AUDIO CONTROL
IC4005 EXP2
TERMINAL P. W. B.
MTS P. W. B.
U/V
V1/SV1/V2
A1/A2
MONITOR OUTPUT
HIFI OUTPUT
TRANCE FORMER T901
RECTIFIER
STAND-BY +12V
IC903
POWER SUPPLY / DEFLECTION P. W. B.
+B CONVER FOCUS SIGNAL
+12V
+130V
+11V
-12V
AUDIO
+20V
+29V
CONVER VER. OUT
+26V
+25V
-25V
NOISE FILTER
RELAY RL901
RECTIFIER
SWITCHING CIRCUIT IC901, IC931
AC INPUT
CONVER. CORRECTION SIGNAL GEN. IC2101
AJDUST CIRCUIT
AMP IC2102
AMP IC2103
AMP IC2104
AMP IC2105
CONVERGNCE CORRECTION
VER. OUT IC601 LA7838
HOR. DRIVE Q701
HOR. OUT Q777 2SC4589
FBT T702
DY
12KV
32KV
CY
CONVERGENCE OUT IC1301 STK4274 R
CONVERGENCE OUT IC1326 STK4274 G
CONVERGENCE OUT IC1351 STK4274 B
HOR. DYNAMIC FOCUS
VER. DYNAMIC FOCUS
FOCUS OUTPUT Q780
R/G/B
FOCUS PACK

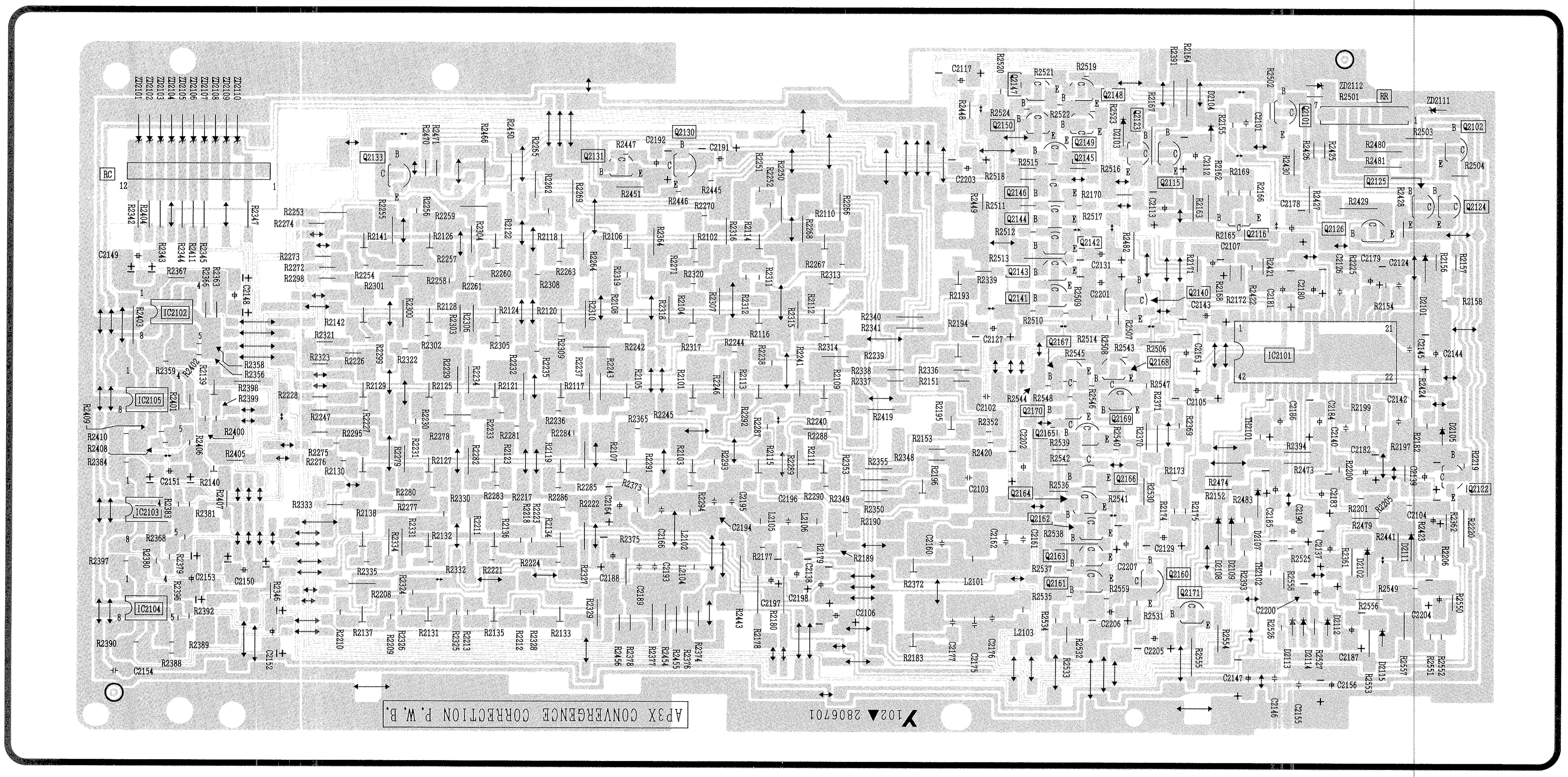
SIGNAL P.C.B.


AP3X SIGNAL P.W.B
TUNER/IF
2806671
MTS
SURROUND
SELCTOR
FRONT-END
AUDIO
3LINE
Y/C SEP.
VIDEO/CHROMA
+9V Reg.
+5V Reg.
PinP
PinP B
PinP G
PinP R
MTS INPUT LEVEL

POWER/DEFLECTION P.C.B.

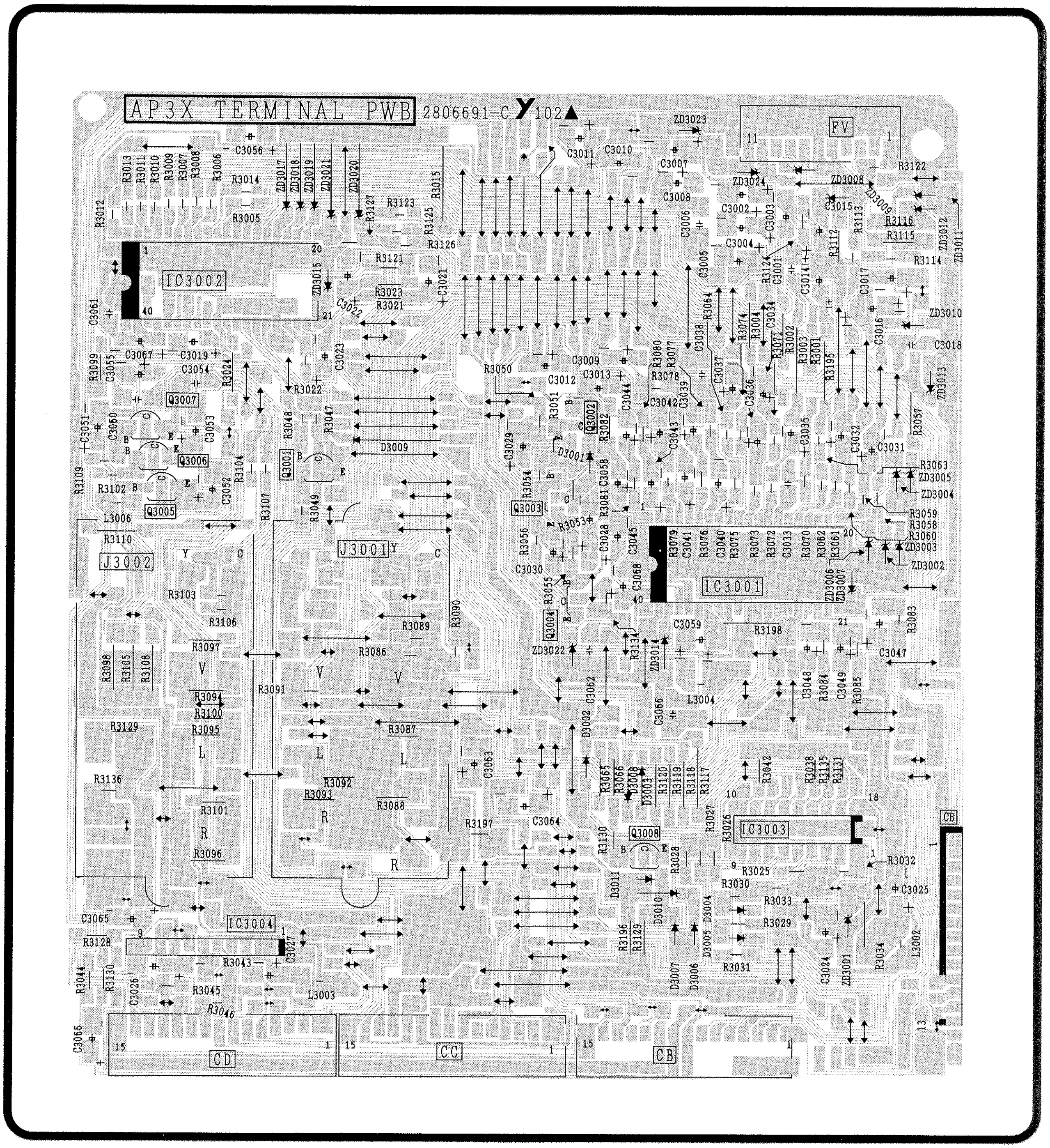


CONVERGENCE CORRECTION P.C.B.


AP3X CONVERGENCE CORRECTION P.W.B.
102 2806701
IC2101
IC2102
IC2103
IC2104
IC2105
RC
RR

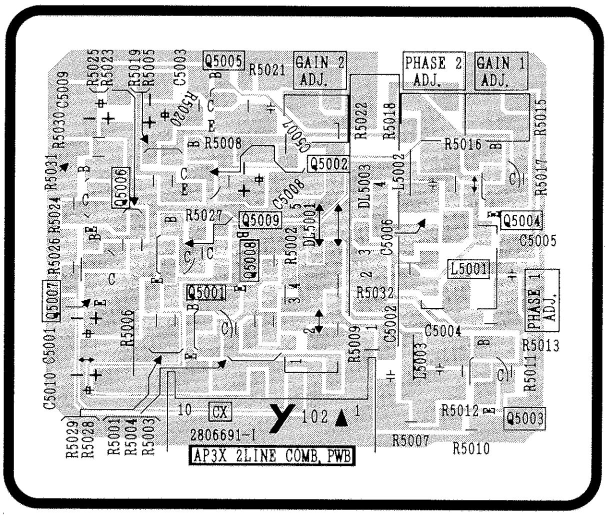
PRINTED CIRCUIT BOARD

TERMINAL P.C.B.


AP3X TERMINAL PWB
2806691-C Y102
IC3001
IC3002
IC3003
IC3004
J3001
J3002
Q3001
Q3002
Q3003
Q3004
Q3005
Q3006
Q3007
Q3008
FV
CB
CC
CD
D3009
L3002
L3003
L3004
L3006
Y
C
V
L
R

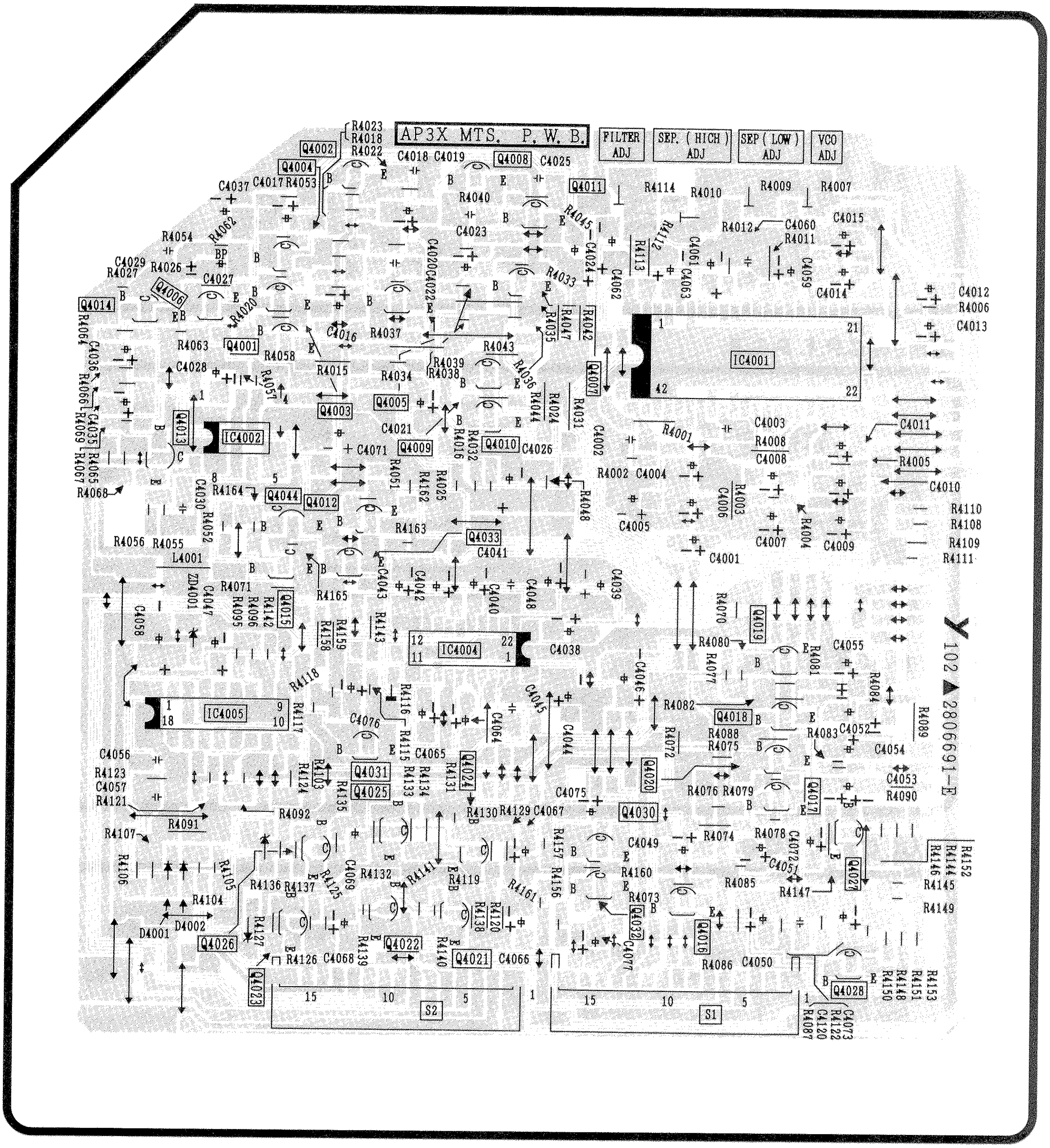
PRINTED CIRCUIT BOARD

2 LINE COMB P.C.B.


Q5005
R5021
GAIN 2 ADJ.
PHASE 2 ADJ.
GAIN 1 ADJ.
R5025
R5023
R5019
R5005
C5003
C5009
R5030
R5031
R5024
R5026
R5020
R5008
C5007
Q5002
C5008
Q5006
R5027
Q5009
Q5008
R5002
DL5001
DL5003
L5002
R5022
R5018
R5016
R5015
R5017
Q5004
C5005
C5006
L5001
PHASE 1 ADJ.
R5032
Q5007
Q5001
R5006
C5001
C5010
R5009
C5002
C5004
L5003
R5013
R5011
R5012
Q5003
R5007
R5010
R5029
R5028
R5001
R5004
R5003
10
CX
2806691-I
Y
102
1
AP3X 2LINE COMB. PWB

PRINTED CIRCUIT BOARD

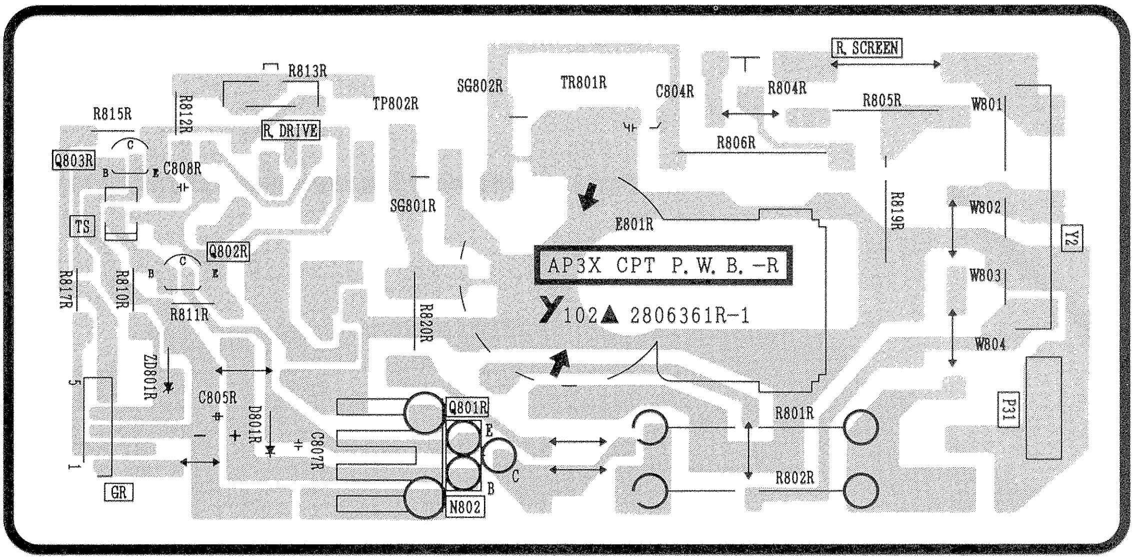
MTS P.C.B.



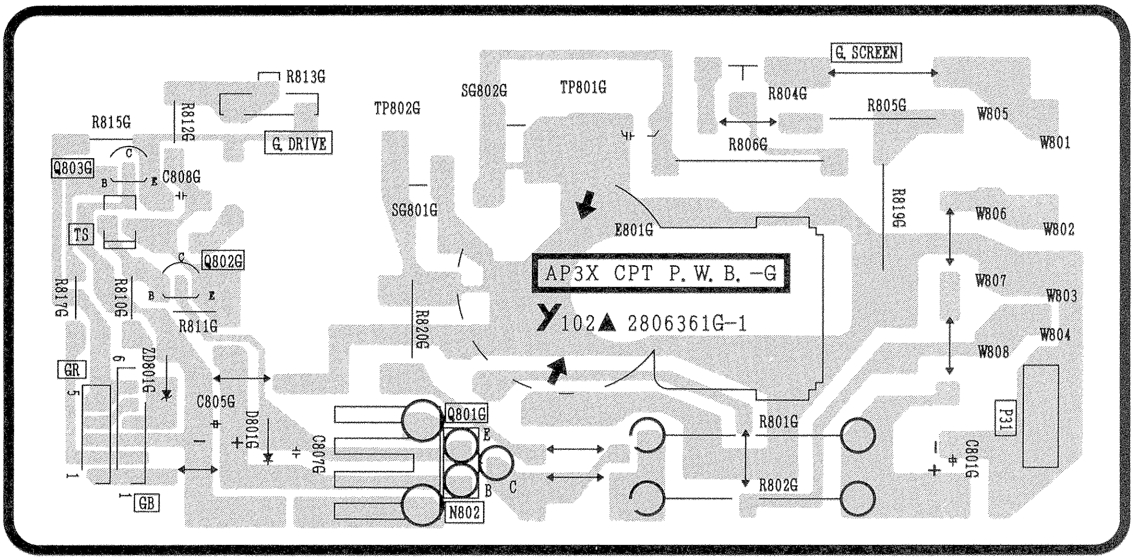
AP3X MTS. P.W.B.
FILTER ADJ
SEP.(HIGH) ADJ
SEP(LOW) ADJ
VCO ADJ
IC4001
IC4002
IC4004
IC4005
Q4001
Q4002
Q4003
Q4004
Q4005
Q4006
Q4007
Q4008
Q4009
Q4010
Q4011
Q4012
Q4013
Q4014
Q4015
Q4016
Q4017
Q4018
Q4019
Q4020
Q4021
Q4022
Q4023
Q4024
Q4025
Q4026
Q4028
Q4030
Q4031
Q4032
Q4033
Q4044
L4001
ZD4001
D4001
D4002
S1
S2
102 ▲ 2806691-E

PRINTED CIRCUIT BOARD

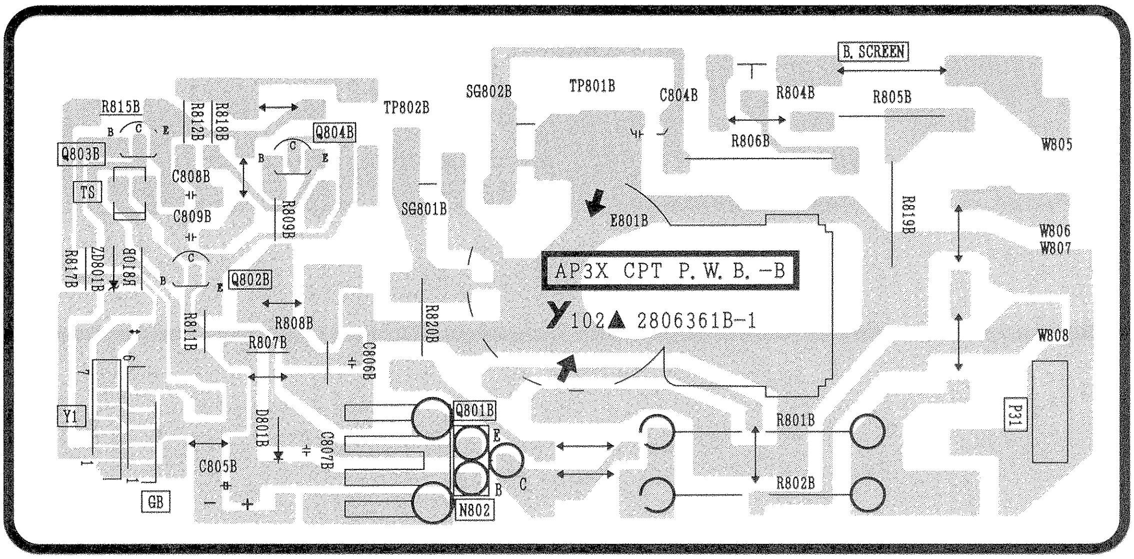
RED C.P.T. P.C.B.


R813R
R815R
R812R
R. DRIVE
TP802R
SG802R
TR801R
C804R
R804R
R. SCREEN
R805R
W801
R806R
Q803R
C808R
TS
SG801R
E801R
R819R
W802
Y2
Q802R
AP3X CPT P. W. B. -R
W803
R817R
R810R
R811R
R820R
102▲ 2806361R-1
W804
ZD801R
C805R
D801R
C807R
Q801R
R801R
P31
R802R
N802
GR

GREEN C.P.T. P.C.B.

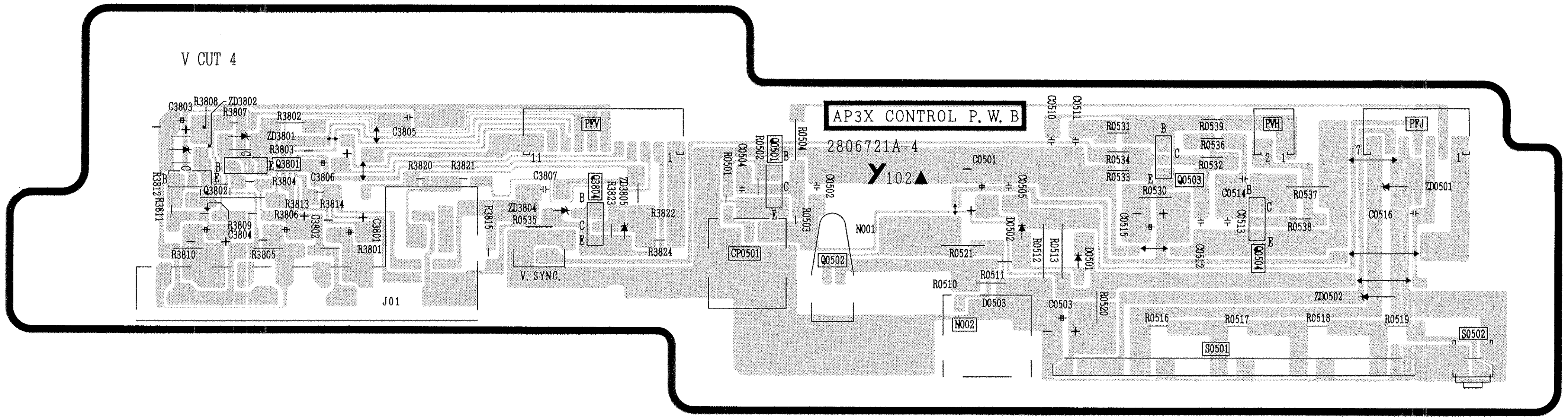

R813G
R815G
R812G
G. DRIVE
TP802G
SG802G
TP801G
R804G
G. SCREEN
R805G
W805
W801
R806G
Q803G
C808G
TS
SG801G
E801G
R819G
W806
W802
Q802G
AP3X CPT P. W. B. -G
W807
W803
R817G
R810G
R811G
R820G
102▲ 2806361G-1
W808
W804
GR
ZD801G
C805G
D801G
C807G
Q801G
R801G
P31
C801G
R802G
N802
GB

BLUE C.P.T. P.C.B.

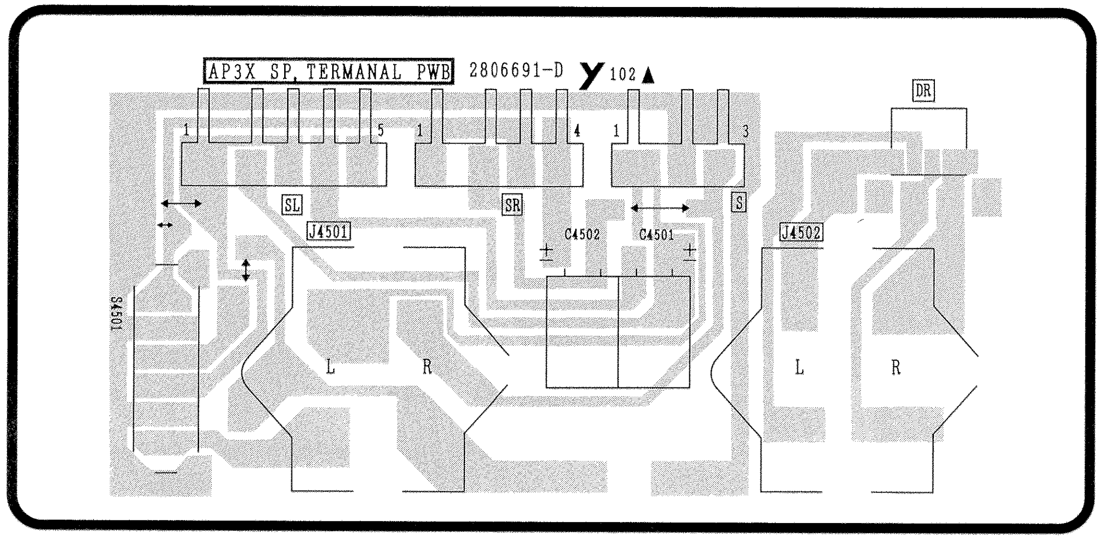

B. SCREEN
R815B
R812B
R818B
TP802B
SG802B
TP801B
C804B
R804B
R805B
Q804B
Q803B
R806B
W805
C808B
TS
C809B
R809B
SG801B
E801B
R819B
W806
W807
R817B
ZD801B
R810B
Q802B
AP3X CPT P. W. B. -B
R811B
R808B
R807B
R820B
102▲ 2806361B-1
W808
C806B
Y1
D801B
Q801B
R801B
P31
C805B
C807B
R802B
GB
N802

PRINTED CIRCUIT BOARD

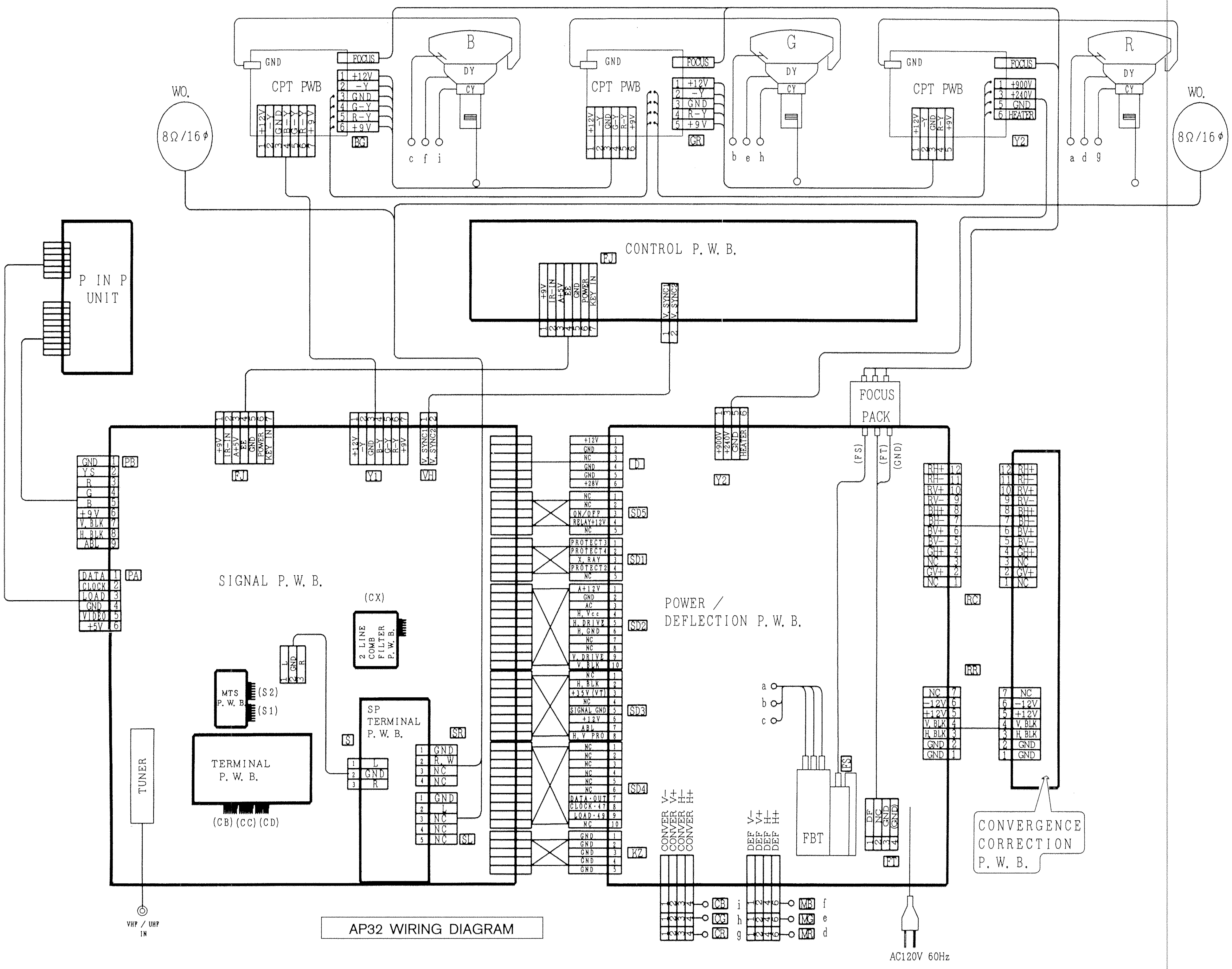
CONTROL P.C.B.


V CUT 4
AP3X CONTROL P. W. B
2806721A-4
Y102▲
C3803
R3808
ZD3802
R3807
R3802
C3805
ZD3801
R3803
Q3801
C3806
R3820
R3821
R3812
R3811
Q3802
R3804
R3813
R3814
R3806
C3802
C3801
R3809
C3804
R3801
R3810
R3805
R3815
J01
PFV
C3807
Q3804
ZD3805
R3823
ZD3804
R0535
R3822
R3824
V. SYNC.
R0501
R0502
C0504
Q0501
R0504
C0502
R0503
CP0501
N001
Q0502
C0501
C0505
D0502
R0521
R0510
R0511
R0512
R0513
D0501
D0503
N002
C0503
R0520
C0510
C0511
R0531
R0534
R0533
R0530
Q0503
R0539
R0536
R0532
C0514
C0513
C0515
C0512
Q0504
R0537
R0538
PVH
PFJ
ZD0501
C0516
ZD0502
R0516
R0517
R0518
R0519
S0501
S0502

SPEAKER TERMINAL P.C.B.

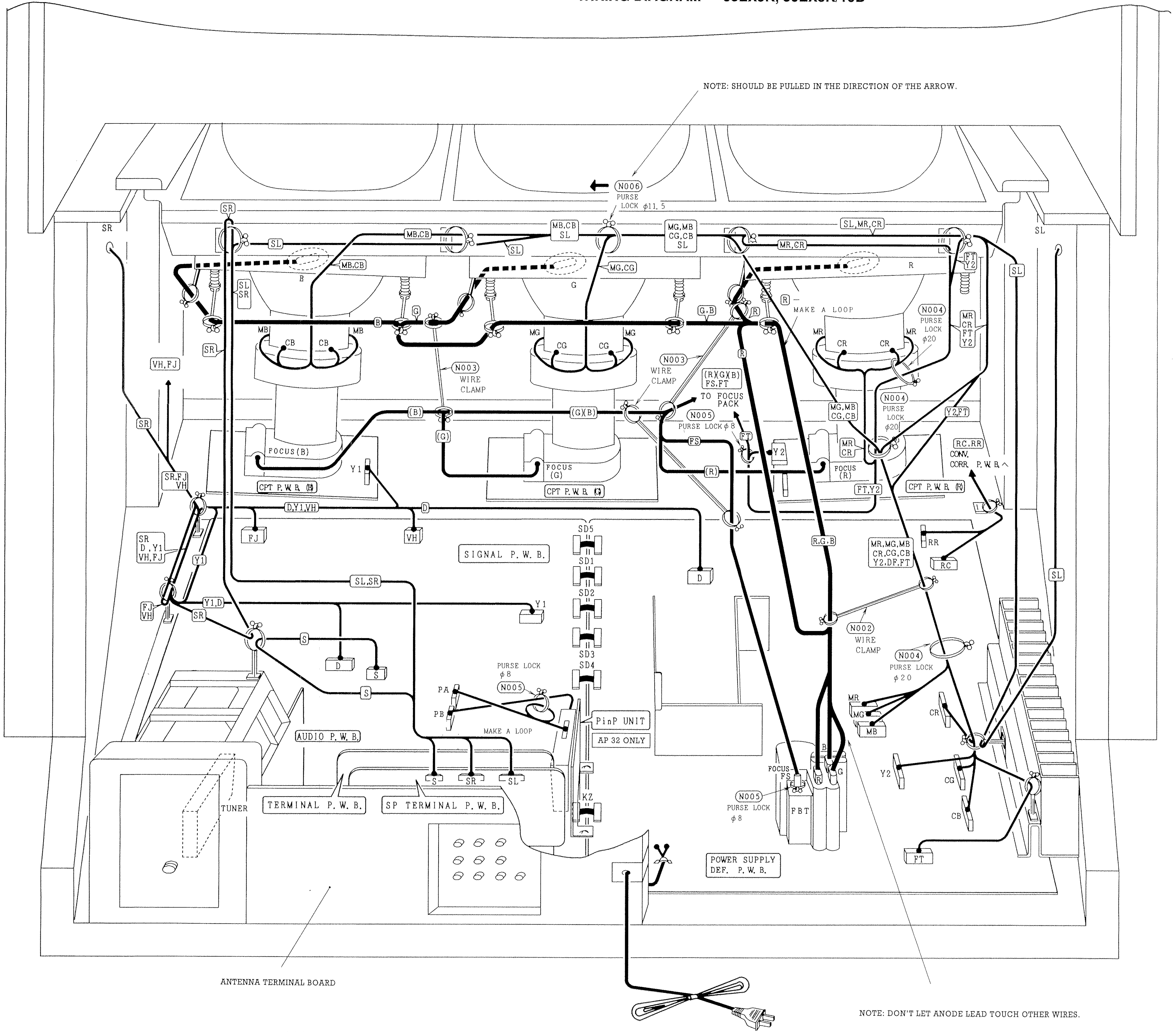

AP3X SP. TERMANAL PWB
2806691-D
Y102▲
DR
SL
SR
S
J4501
J4502
C4502
C4501
S4501
L
R
L
R

WIRING DIAGRAM


B
G
R
DY
CY
GND
FOCUS
CPT PWB
+12V
-Y
GND
G-Y
R-Y
+9V
+900V
+240V
HEATER
BG
GR
Y2
c f i
b e h
a d g
WO.
8Ω/16φ
P IN P UNIT
CONTROL P. W. B.
FJ
+9V
IR-IN
A+5V
EE
POWER
KEY IN
V. SYNC1
V. SYNC2
Y1
VH
FOCUS PACK
(FS)
(FT)
(GND)
SIGNAL P. W. B.
PB
YS
R
G
B
V. BLK
H. BLK
ABL
PA
DATA
CLOCK
LOAD
VIDEO
+5V
(CX)
2 LINE COMB FILTER P. W. B.
MTS P. W. B.
(S2)
(S1)
L
GND
R
SP TERMINAL P. W. B.
S
SR
SL
R. W
NC
TERMINAL P. W. B.
(CB) (CC) (CD)
TUNER
VHF / UHF IN
D
+28V
SD5
ON/OFF
RELAY+12V
SD1
PROTECT3
PROTECT4
X. RAY
PROTECT2
SD2
A+12V
AC
H. Vcc
H. DRIVE
H. GND
V. DRIVE
V. BLK
SD3
+35V (VT)
SIGNAL GND
H. V PRO
SD4
DATA-OUT
CLOCK-47
LOAD-48
KZ
POWER / DEFLECTION P. W. B.
CONVER V-
CONVER V+
CONVER H-
CONVER H+
DEF V-
DEF V+
DEF H-
DEF H+
CB
CG
CR
MB
MG
MR
FBT
FS
DF
FT
AC120V 60Hz
RH+
RH-
RV+
RV-
BH+
BH-
BV+
BV-
GH+
GV+
RC
RR
-12V
CONVERGENCE CORRECTION P. W. B.

AP32 WIRING DIAGRAM

WIRING DIAGRAM — 55EX9K, 50EX8K/10B

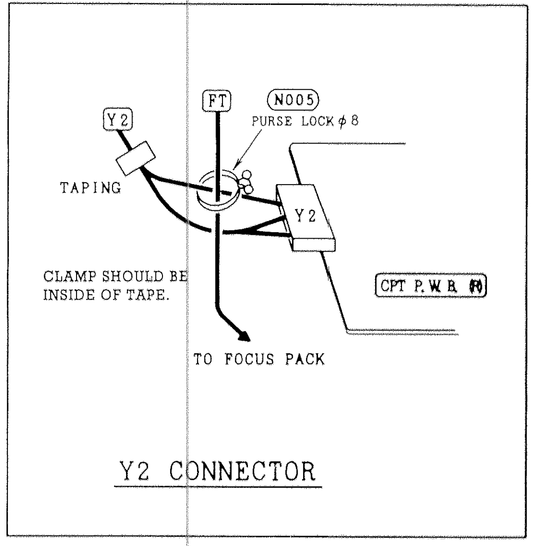

NOTE: SHOULD BE PULLED IN THE DIRECTION OF THE ARROW.

NOTE: DON'T LET ANODE LEAD TOUCH OTHER WIRES.

ANTENNA TERMINAL BOARD

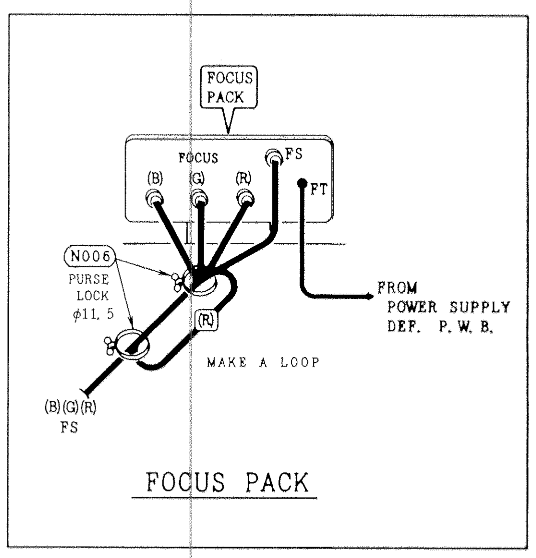
POWER CORD

N006
PURSE LOCK ϕ11.5
SR
SL
MB,CB
MB,CB SL
MG,MB CG,CB SL
SL,MR,CR
MR,CR
MB,CB
MG,CG
B
G
R
SL SR
FT Y2
MAKE A LOOP
G,B
N004 PURSE LOCK ϕ20
MR CR FT Y2
MB
CB
MG
CG
MR
CR
VH,FJ
N003 WIRE CLAMP
(R)(G)(B) FS,FT
TO FOCUS PACK
N005 PURSE LOCK ϕ8
FS
FT
Y2
(B)
(G)(B)
FOCUS(B)
FOCUS (G)
FOCUS (R)
Y1
CPT P.W.B. (B)
CPT P.W.B. (G)
CPT P.W.B. (R)
MG,MB CG,CB
MR CR
Y2,FT
RC,RR CONV. CORR. P.W.B.
FT,Y2
SR.FJ VH
D,Y1,VH
D
FJ
VH
SR D,Y1 VH,FJ
Y1
SIGNAL P.W.B.
SD5
SD1
SD2
SD3
SD4
SL,SR
R,G,B
MR,MG,MB CR,CG,CB Y2,DF,FT
RR
RC
FJ VH
Y1,D
SR
S
D
N002 WIRE CLAMP
N004 PURSE LOCK ϕ20
PURSE LOCK ϕ8
N005
PA
PB
MAKE A LOOP
PinP UNIT
AP 32 ONLY
AUDIO P.W.B.
MR
MG
MB
CR
Y2
CG
CB
S
SR
SL
TERMINAL P.W.B.
SP TERMINAL P.W.B.
TUNER
KZ
FOCUS
FS
N005 PURSE LOCK ϕ8
FBT
POWER SUPPLY DEF. P.W.B.
FT



Y2
FT
N005
PURSE LOCK ϕ8
TAPING
Y2
CLAMP SHOULD BE INSIDE OF TAPE.
CPT P.W.B. (R)
TO FOCUS PACK

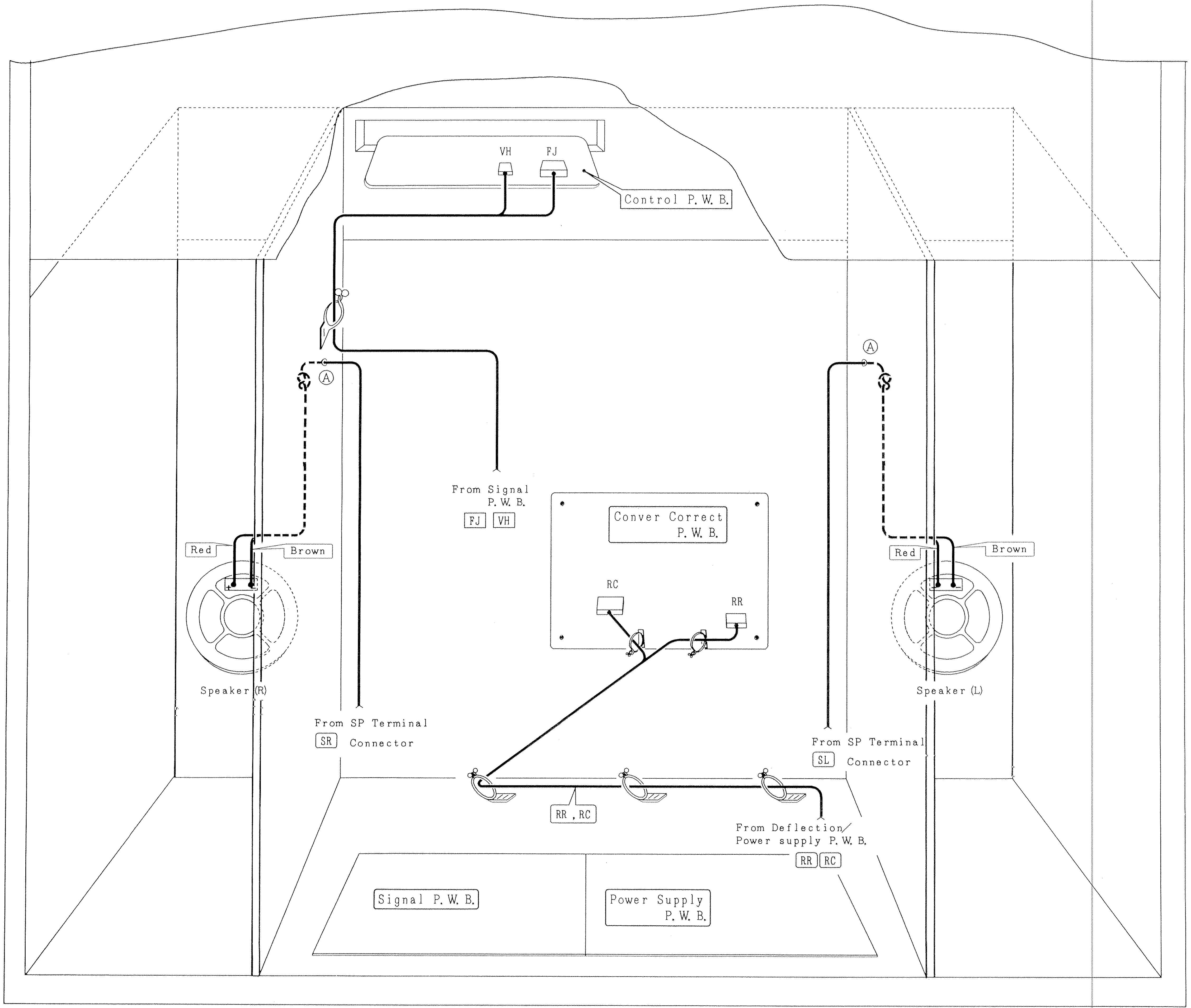
Y2 CONNECTOR



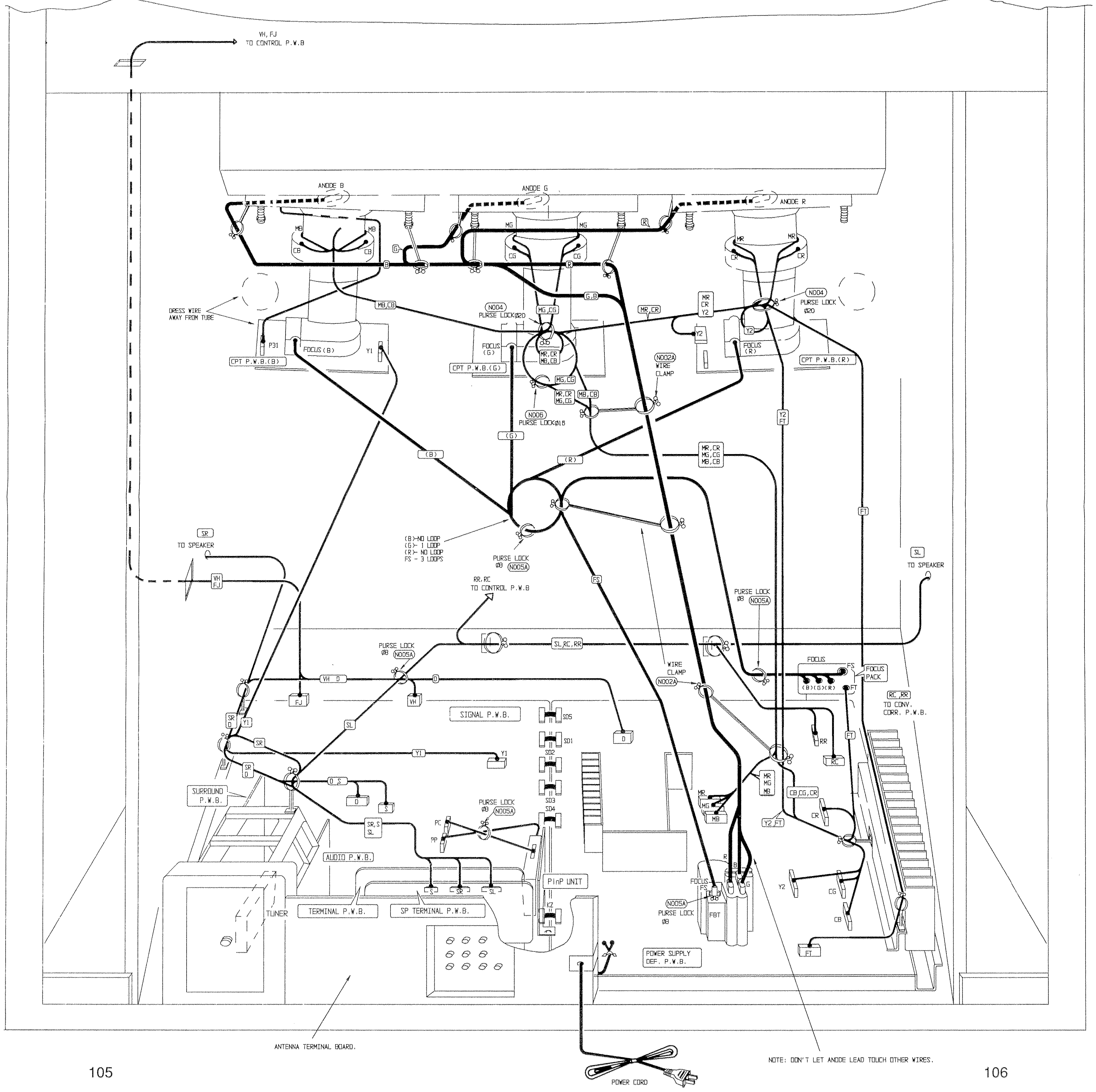
FOCUS PACK
FOCUS
(B)
(G)
(R)
FS
FT
N006
PURSE LOCK ϕ11.5
(R)
MAKE A LOOP
FROM POWER SUPPLY DEF. P.W.B.
(B)(G)(R) FS

FOCUS PACK

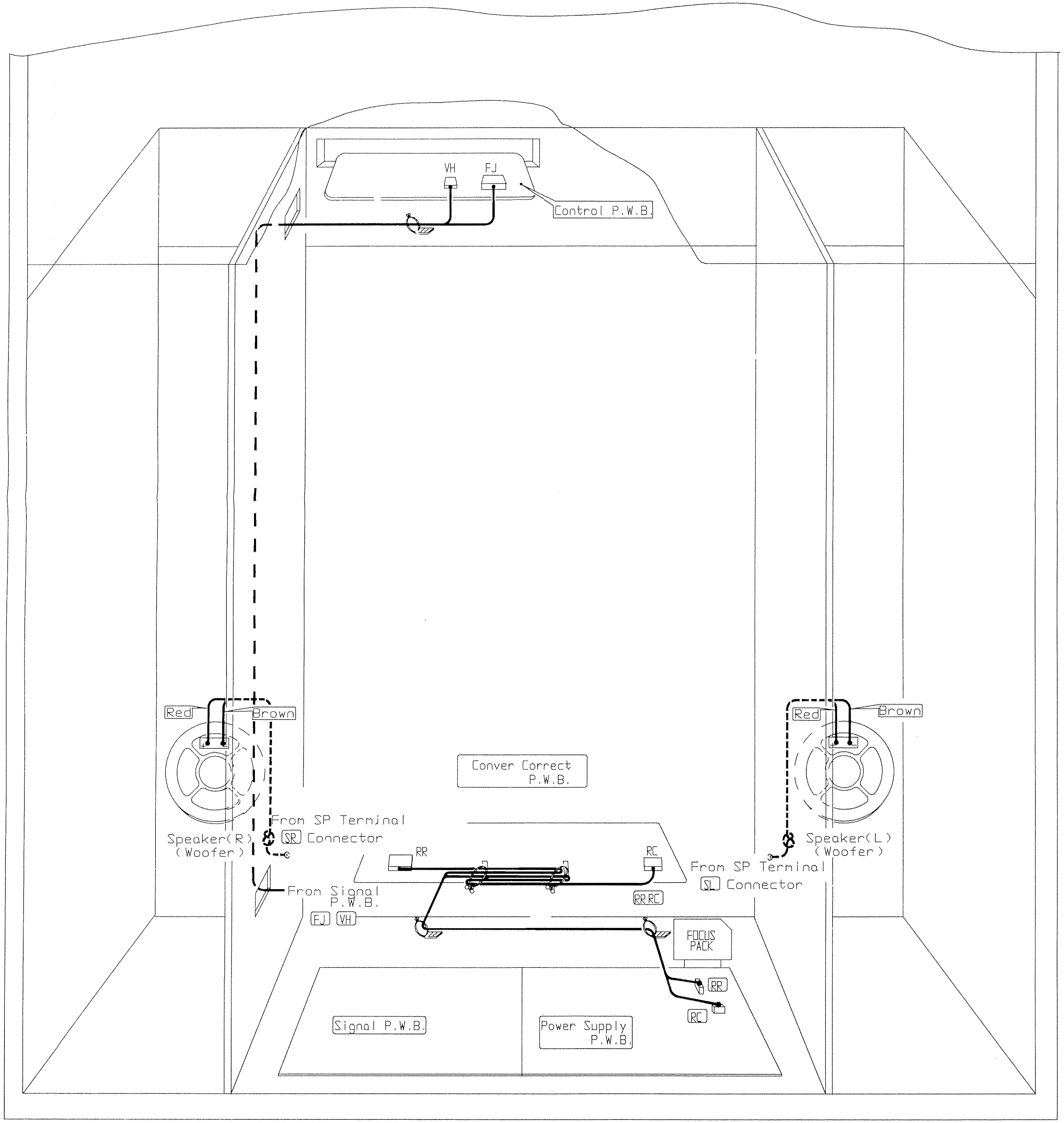
WIRING DIAGRAM — 55EX9K, 50 EX8K/10B


VH
FJ
Control P. W. B.
Ⓐ
From Signal P. W. B.
FJ
VH
Conver Correct P. W. B.
RC
RR
Red
Brown
Speaker (R)
Speaker (L)
From SP Terminal Connector
SR
SL
RR , RC
From Deflection/ Power supply P. W. B.
RR
RC
Signal P. W. B.
Power Supply P. W. B.

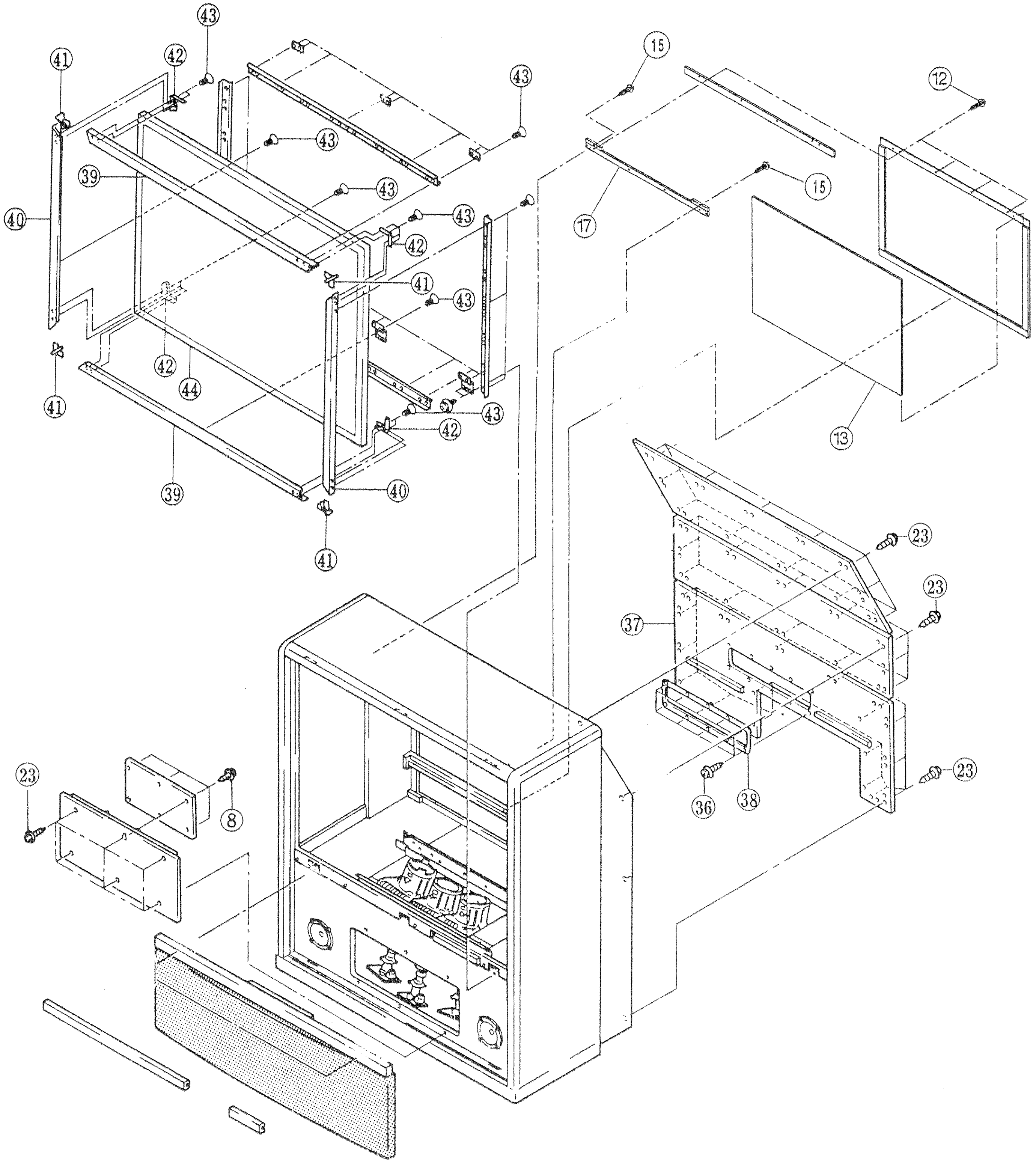
50EX11BV WIRING DRESS DRAWING


VH, FJ
TO CONTROL P.W.B
ANODE B
ANODE G
ANODE R
MB
CB
MG
CG
MR
CR
B
G
R
G,B
MB,CB
MG,CG
MR,CR
MR
CR
Y2
DRESS WIRE
AWAY FROM TUBE
N004
PURSE LOCKØ20
N004
PURSE LOCK
Ø20
P31
FOCUS (B)
Y1
CPT P.W.B.(B)
FOCUS
(G)
CPT P.W.B.(G)
FOCUS
(R)
CPT P.W.B.(R)
MR,CR
MB,CB
MG,CG
MR,CR
MG,CG
MB,CB
N006
PURSE LOCKØ16
N002A
WIRE
CLAMP
Y2
FT
(G)
(B)
(R)
MR,CR
MG,CG
MB,CB
FT
(B)-NO LOOP
(G)- 1 LOOP
(R)- NO LOOP
FS - 3 LOOPS
PURSE LOCK
Ø8 N005A
FS
SR
TO SPEAKER
VH
FJ
RR, RC
TO CONTROL P.W.B
SL
TO SPEAKER
PURSE LOCK
Ø8 N005A
SL,RC,RR
PURSE LOCK
Ø8 N005A
WIRE
CLAMP
N002A
FOCUS
FS
FOCUS
PACK
(B)(G)(R)
FT
RC, RR
TO CONV.
CORR. P.W.B.
VH D
D
FJ
VH
SR
D
Y1
SIGNAL P.W.B.
SD5
SD1
SD2
SD3
SD4
D
SL
SR
Y1
Y1
SR
D
D S
D
S
SURROUND
P.W.B.
SR, S
SL
PURSE LOCK
Ø8 N005A
PC
PP
AUDIO P.W.B.
PInP UNIT
S
SR
SL
TUNER
TERMINAL P.W.B.
SP TERMINAL P.W.B.
KZ
RR
RC
FT
MR
MG
MB
MR
MG
MB
CB,CG,CR
CR
Y2,FT
R
B
G
FOCUS
FS
N005A
PURSE LOCK
Ø8
FBT
Y2
CG
CB
FT
POWER SUPPLY
DEF. P.W.B.
ANTENNA TERMINAL BOARD.
NOTE: DON'T LET ANODE LEAD TOUCH OTHER WIRES.
POWER CORD

50EX11BV WIRING DRESS DRAWING

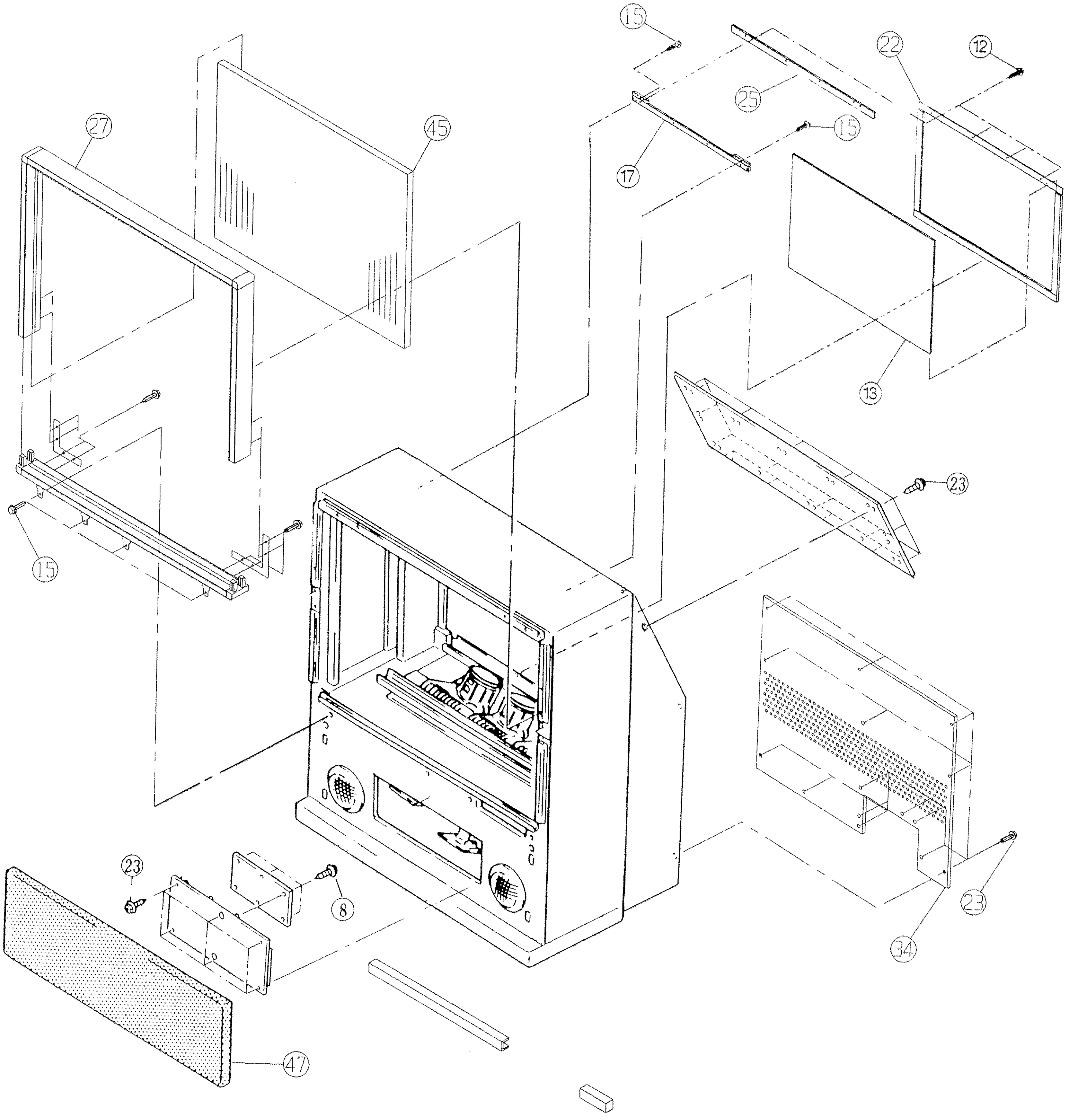

VH
FJ
Control P.W.B.
Red
Brown
Red
Brown
Conver Correct P.W.B.
From SP Terminal
SR Connector
Speaker(R)
(Woofer)
Speaker(L)
(Woofer)
From SP Terminal
SL Connector
RR
RC
RR RC
From Signal P.W.B.
FJ VH
FOCUS PACK
RR
RC
Signal P.W.B.
Power Supply P.W.B.

EXPLODED VIEW 55EX9K (1/3)


43
41
42
15
43
12
43
39
43
15
40
43
17
42
41
43
42
44
41
43
42
13
39
40
41
23
23
37
23
23
8
36
38

Note: Some parts may appear different than those shown in the exploded view. When ordering, refer to the REPLACEMENT PARTS LIST for correct part number. Since this Service Manual covers several models, use care to select the correct part for the model being serviced.

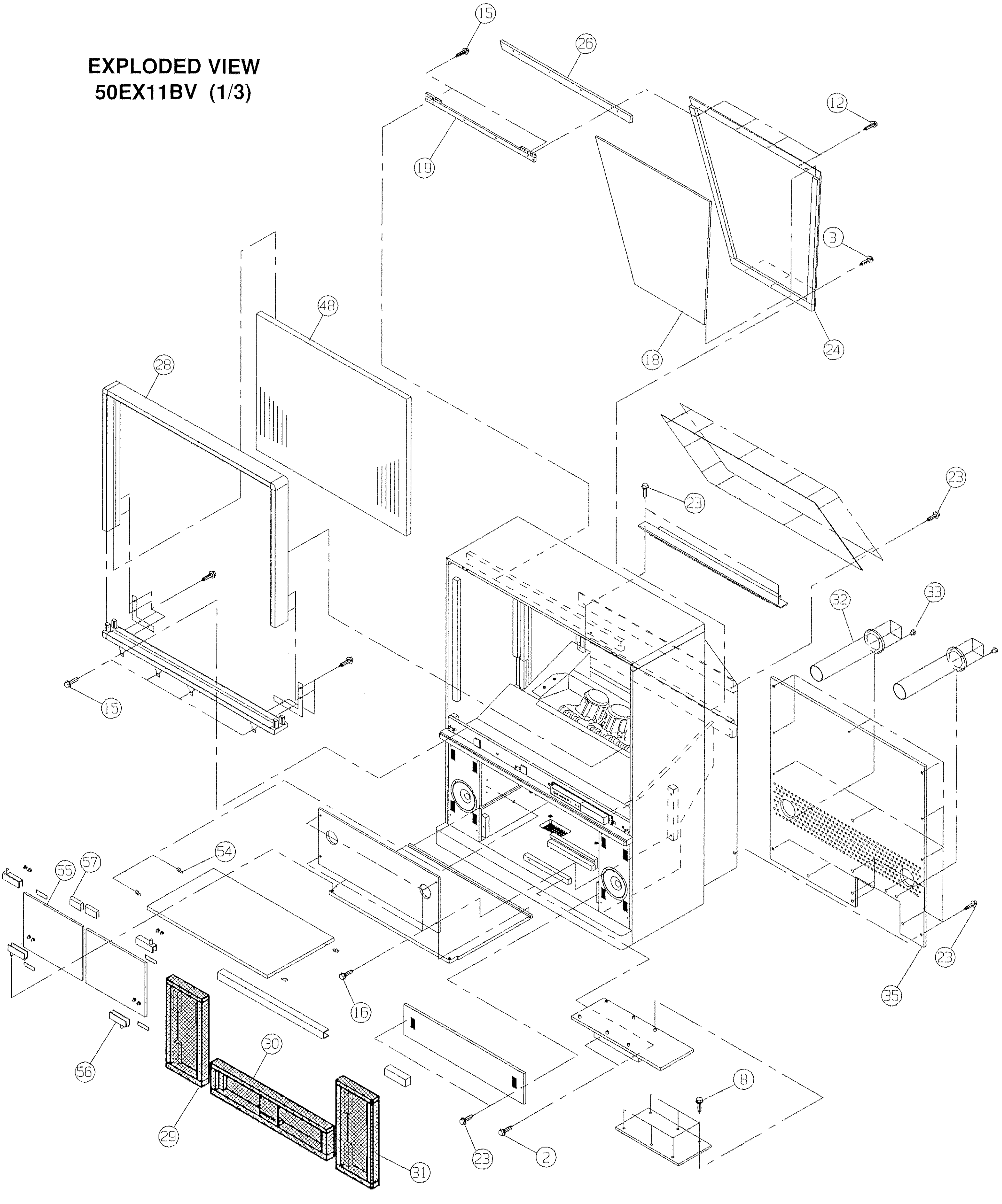
EXPLODED VIEW 50EX8K / 50EX10B (1/3)



15
22
12
25
15
27
45
17
13
23
15
23
8
23
34
47

Note: Some parts may appear different than those shown in the exploded view. When ordering, refer to the REPLACEMENT PARTS LIST for correct part number. Since this Service Manual covers several models, use care to select the correct part for the model being serviced.

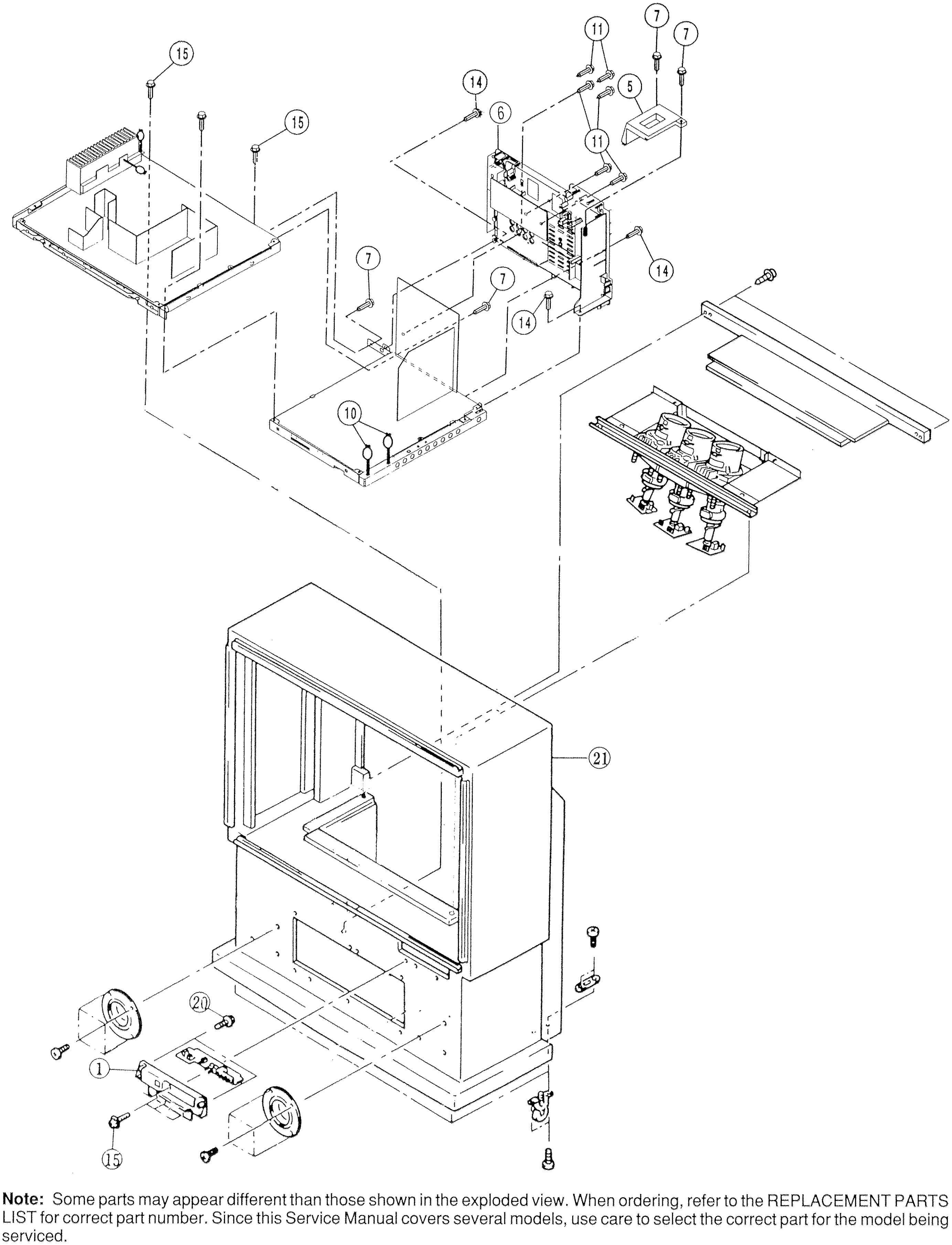
EXPLODED VIEW
50EX11BV (1/3)



15
26
12
19
3
48
18
24
28
23
23
15
32
33
54
55
57
16
23
35
8
56
30
29
31
23
2

Note: Some parts may appear different than those shown in the exploded view. When ordering, refer to the REPLACEMENT PARTS LIST for correct part number. Since this Service Manual covers several models, use care to select the correct part for the model being serviced.

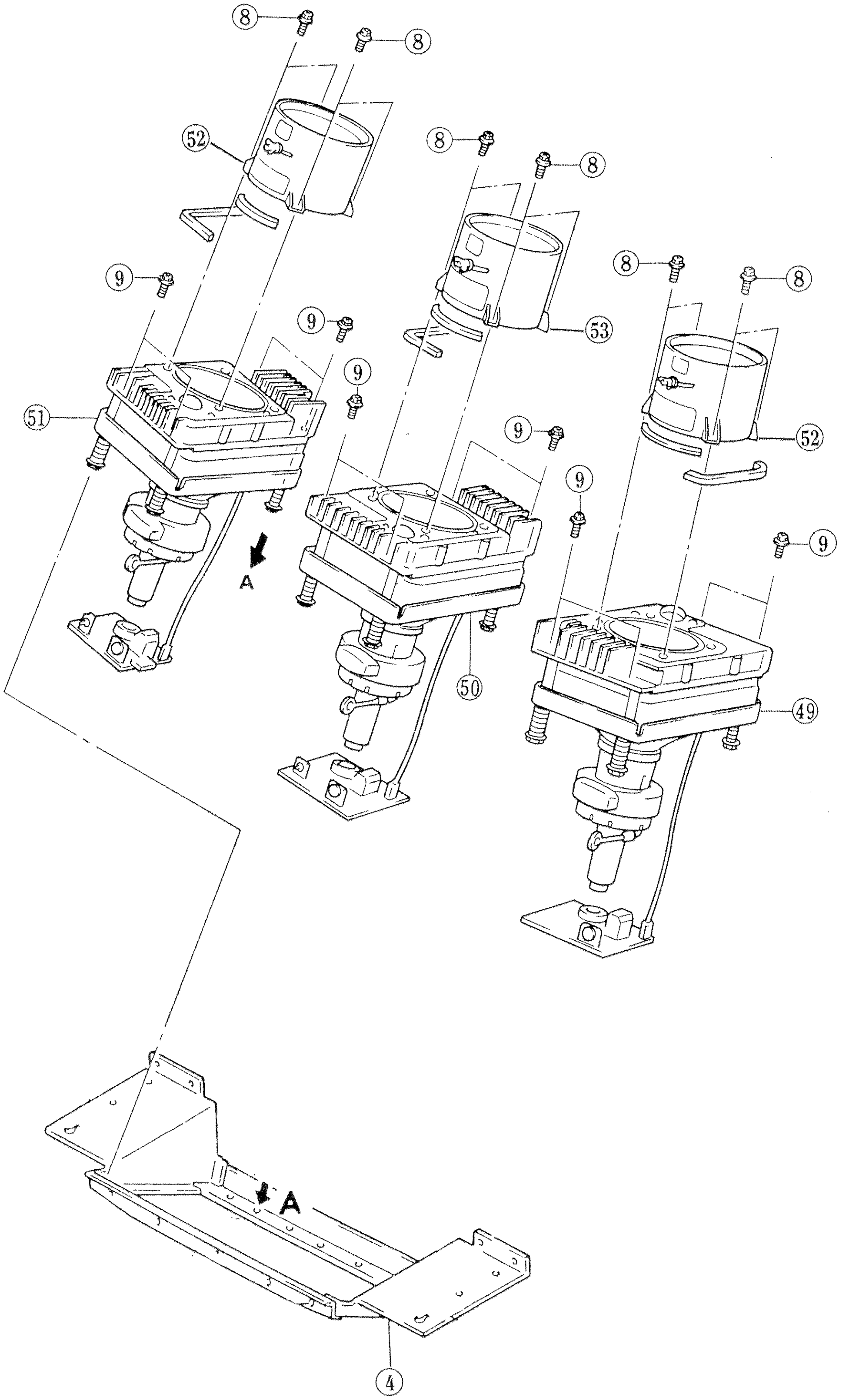
EXPLODED VIEW (2/3)



15
15
14
6
11
7
7
5
11
14
7
7
14
10
21
20
1
15

Note: Some parts may appear different than those shown in the exploded view. When ordering, refer to the REPLACEMENT PARTS LIST for correct part number. Since this Service Manual covers several models, use care to select the correct part for the model being serviced.

EXPLODED VIEW (3/3)



8
8
52
8
8
9
9
53
8
8
9
51
9
52
9
A
9
50
9
49
A
4

Note: Some parts may appear different than those shown in the exploded view. When ordering, refer to the REPLACEMENT PARTS LIST for correct part number. Since this Service Manual covers several models, use care to select the correct part for the model being serviced.

REPLACEMENT PARTS LIST

PRODUCT SAFETY NOTE: Components marked with a ⚠ have special characteristics important to safety. Before replacing any of these components, read carefully, the PRODUCT SAFETY NOTICE of this Service Manual. Don't degrade the safety of the receiver through improper servicing.

ABBREVIATIONS

Capacitors.......... CD:Ceramic Disc, PF:Polyester Film, EL: Electrolytic, PP: Polypropylene, PR: Paper, TA: Tantalum, TM: Trimmer

Resistors............. CF: Carbon Film, CC: Carbon Composition, MF: Metal oxide Film, VR: Variable Resistor, WW: Wire Wound, FR: Fuse Resistor, MG: Metal Glazed

Semiconductors.... TR: Transistor, DI: diode, ZD: Zener Diode, VA: Varistor, TH: Thermistor, IC: Integrated Circuit

SYMBOL NO.	PART NO.	PART DESCRIPTION
		CAPACITORS
C0001	0800048	EL 100MF 10V
C0002	0244171	CD 0.01MF +80-20% 50V
C0005	0244171	CD 0.01MF +80-20% 50V
C0006	0880057	PF 0.1MF +-10% 50V
C0009	0800009	EL 4.7MF 25V
C0010	0800009	EL 4.7MF 25V
C0011	0800009	EL 4.7MF 25V
C0012	0800009	EL 4.7MF 25V
C0013	0800009	EL 4.7MF 25V
C0018	0880048	PF 0.022MF +-10% 50V
C0019	0800023	EL 22MF 16V
C0020	0890087	CD1000PF +-10% 50V
C0021	0880057	PF 0.1MF +-10% 50V
C0022	0800003	EL 1MF 50V
C0023	0890067	CD33PF +-5% 50V
C0024	0890067	CD33PF +-5% 50V
C0025	0880053	PF 0.047MF +-10% 50V
C0027	0880051	PF 0.033MF +-10% 50V
C0031	0800048	EL 100MF 10V
C0032	0244171	CD 0.01MF +80-20% 50V
C0033	0890074	CD100PF +-5% 50V
C0034	0880051	PF 0.033MF +-10% 50V
C0035	0800009	EL 4.7MF 25V
C0037	0890069	CD47PF +-5% 50V
C0038	0800048	EL 100MF 10V
C0039	0244171	CD 0.01MF +80-20% 50V
C0040	0800003	EL 1MF 50V
C0041	0880046	PF 0.015MF +-10% 50V
C0042	0244107	CD 3300PF +-10% 50V
C0045	0800049	EL 100MF 16V
C0046	0890067	CD33PF +-5% 50V
C0047	0890067	CD33PF +-5% 50V
C0048	0800048	EL 100MF 10V
C0049	0244171	CD 0.01MF +80-20% 50V
C0052	0800003	EL 1MF 50V
C0053	0800049	EL 100MF 16V
C0054	0800039	EL 47MF 10V
C0055	0800015	EL 10MF 16V
C0056	0800048	EL 100MF 10V
C0057	0890074	CD100PF +-5% 50V
C0058	0890071	CD56PF +-5% 50V
C0059	0890087	CD1000PF +-10% 50V
C0060	0890079R	CD270PF +-10% 50V
C0061	0800049	EL 100MF 16V
C0062	0244171	CD 0.01MF +80-20% 50V
C0064	0890074	CD100PF +-5% 50V
C0065	0890074	CD100PF +-5% 50V
C0066	0890074	CD100PF +-5% 50V
C0067	0890074	CD100PF +-5% 50V
C0068	0890074	CD100PF +-5% 50V
C0069	0890074	CD100PF +-5% 50V
C0070	0800049	EL 100MF 16V
C0071	0800049	EL 100MF 16V
C0074	0800074	EL 470MF 16V
C0076	0890033	CD680PF +-10% 50V
C0077	0890077	CD180PF +-10% 50V
C0501	0800023	EL 22MF 16V
C0502	0244171	CD 0.01MF +80-20% 50V
C0503	0800003	EL 1MF 50V
C0504	0244171	CD 0.01MF +80-20% 50V
C0505	0244171	CD 0.01MF +80-20% 50V
C0510	0880011	PF 0.015MF +-10% 50V
C0511	0880013	PF 0.033MF +-10% 50V
C0512	0880006	PF 3300PF +-10% 50V
C0513	0880006	PF 3300PF +-10% 50V
C0514	0880016	PF 0.1MF +-10% 50V
C0515	0800015	EL 10MF 16V
C0516	0880016	PF 0.1MF +-10% 50V
C0961	0880057	PF 0.1MF +-10% 50V
C0962	0800075	EL 470MF 25V
C0963	0880057	PF 0.1MF +-10% 50V
C0964	0880057	PF 0.1MF +-10% 50V
C0965	0800075	EL 470MF 25V
C0966	0880057	PF 0.1MF +-10% 50V
C0967	0880057	PF 0.1MF +-10% 50V
C0968	0880057	PF 0.1MF +-10% 50V
C0969	0800075	EL 470MF 25V
C1109	0800049	EL 100MF 16V
C1117	0800049	EL 100MF 16V
C1301	0890087	CD1000PF +-10% 50V
C1302	0800044	EL 47MF 50V
C1311	0890087	CD1000PF +-10% 50V
C1312	0800044	EL 47MF 50V

PRODUCT SAFETY NOTE: Components marked with a ⚠ have special characteristics important to safety. Before replacing any of these components, read carefully, the PRODUCT SAFETY NOTICE of this Service Manual. Don't degrade the safety of the receiver through improper servicing.

SYMBOL NO.	PART NO.	PART DESCRIPTION	SYMBOL NO.	PART NO.	PART DESCRIPTION
C1326	0890087	CD1000PF +-10% 50V	C2166	0880013	PF 0.033MF +-10% 50V
C1327	0800044	EL 47MF 50V	C2175	0299029	PP 0.015MF +-2% 100V
C1336	0890087	CD1000PF +-10% 50V	C2176	0880009	PF 0.01MF +-10% 50V
C1337	0800044	EL 47MF 50V	C2177	0880011	PF 0.015MF +-10% 50V
C1351	0890087	CD1000PF +-10% 50V	C2178	0800003	EL 1MF 50V
C1352	0800044	EL 47MF 50V	C2179	0800003	EL 1MF 50V
C1361	0890087	CD1000PF +-10% 50V	C2180	0800003	EL 1MF 50V
C1362	0800044	EL 47MF 50V	C2181	0800003	EL 1MF 50V
C1387	0258178G	EL 470MF,63V	C2182	0800015	EL 10MF 16V
C1389	0258178G	EL 470MF,63V	C2183	0800003	EL 1MF 50V
C1501	0800041	EL 47MF 16V	C2184	0800015	EL 10MF 16V
C1502	0800041	EL 47MF 16V	C2185	0800003	EL 1MF 50V
C1517	0880044	PF 0.01MF +-10% 50V	C2186	0800003	EL 1MF 50V
C1520	0880044	PF 0.01MF +-10% 50V	C2187	0800003	EL 1MF 50V
C1523	0880044	PF 0.01MF +-10% 50V	C2188	0800003	EL 1MF 50V
C1526	0880044	PF 0.01MF +-10% 50V	C2189	0880012	PF 0.022MF +-10% 50V
C2101	0244136	CD 270PF +-10% 50V	C2190	0800015	EL 10MF 16V
C2103	0880001	PF 680PF +-10% 50V	C2191	0800003	EL 1MF 50V
C2104	0800015	EL 10MF 16V	C2192	0800015	EL 10MF 16V
C2105	0800003	EL 1MF 50V	C2195	0880012	PF 0.022MF +-10% 50V
C2106	0800015	EL 10MF 16V	C2196	0880012	PF 0.022MF +-10% 50V
C2107	0800015	EL 10MF 16V	C2197	0800003	EL 1MF 50V
C2112	0800001	EL 0.47MF 50V	C2198	0800003	EL 1MF 50V
C2113	0800015	EL 10MF 16V	C3006	0244171	CD 0.01MF +80-20% 50V
C2117	0800015	EL 10MF 16V	C3007	0800015	EL 10MF 16V
C2124	0880005	PF 2200PF +-10% 50V	C3010	0800015	EL 10MF 16V
C2126	0299001	PP 0.001MF +-2% 100V	C3013	0800015	EL 10MF 16V
C2127	0800003	EL 1MF 50V	C3019	0800023	EL 22MF 16V
C2129	0800015	EL 10MF 16V	C3021	0800015	EL 10MF 16V
C2131	0800015	EL 10MF 16V	C3024	0800047	EL 100MF 6.3V
C2137	0800049	EL 100MF 16V	C3025	0800041	EL 47MF 16V
C2138	0800015	EL 10MF 16V	C3028	0800041	EL 47MF 16V
C2139	0800015	EL 10MF 16V	C3029	0800009	EL 4.7MF 25V
C2140	0880014	PF 0.047MF +-10% 50V	C3030	0800015	EL 10MF 16V
C2142	0880016	PF 0.1MF +-10% 50V	C3038	0244171	CD 0.01MF +80-20% 50V
C2143	0800049	EL 100MF 16V	C3039	0800015	EL 10MF 16V
C2144	0800041	EL 47MF 16V	C3040	0800003	EL 1MF 50V
C2145	0244141	CD 0.01MF +-10% 50V	C3041	0800003	EL 1MF 50V
C2146	0244141	CD 0.01MF +-10% 50V	C3042	0800015	EL 10MF 16V
C2147	0800041	EL 47MF 16V	C3043	0800003	EL 1MF 50V
C2148	0252417	EL 1MF 50V	C3044	0800015	EL 10MF 16V
C2149	0252417	EL 1MF 50V	C3045	0800023	EL 22MF 16V
C2150	0252417	EL 1MF 50V	C3047	0800015	EL 10MF 16V
C2151	0252417	EL 1MF 50V	C3048	0800003	EL 1MF 50V
C2152	0252417	EL 1MF 50V	C3049	0800003	EL 1MF 50V
C2153	0252417	EL 1MF 50V	C3051	0800041	EL 47MF 16V
C2154	0244229	CD 150PF +-10% 50V	C3052	0800074	EL 470MF 16V
C2155	0244141	CD 0.01MF +-10% 50V	C3055	0800015	EL 10MF 16V
C2156	0800044	EL 47MF 50V	C3056	0800015	EL 10MF 16V
C2160	0880011	PF 0.015MF +-10% 50V	C3058	0800003	EL 1MF 50V
C2161	0880009	PF 0.01MF +-10% 50V	C3059	0284638	EL 10MF 16V
C2162	0299029	PP 0.015MF +-2% 100V	C3060	0244171	CD 0.01MF +80-20% 50V
C2163	0800003	EL 1MF 50V	C3061	0880057	PF 0.1MF +-10% 50V
C2164	0800003	EL 1MF 50V	C3062	0880057	PF 0.1MF +-10% 50V

PRODUCT SAFETY NOTE: Components marked with a ⚠ have special characteristics important to safety. Before replacing any of these components, read carefully, the PRODUCT SAFETY NOTICE of this Service Manual. Don't degrade the safety of the receiver through improper servicing.

SYMBOL NO.	PART NO.	PART DESCRIPTION	SYMBOL NO.	PART NO.	PART DESCRIPTION
C3063	0800015	EL 10MF 16V	C4020	0880059	P F 0.15MF 50V
C3064	0800015	EL 10MF 16V	C4021	0800009	EL 4.7MF 25V
C3065	0800015	EL 10MF 16V	C4022	0800003	EL 1MF 50V
C3066	0800015	EL 10MF 16V	C4023	0880059	PF 0.15MF 50V
C3067	0800041	EL 47MF 16V	C4024	0800003	EL 1MF 50V
C3068	0800041	EL 47MF 16V	C4025	0880059	PF 0.15MF 50V
C3504	0800049	EL 100MF 16V	C4026	0800041	EL 47MF 16V
C3505	0244171	CD 0.01MF +80-20% 50V	C403	0800003	EL 1MF 50V
C3508	0800015	EL 10MF 16V	C4038	0800015	EL 10MF 16V
C3509	0800015	EL 10MF 16V	C4039	0800074	EL 470MF 16V
C3513	0890113	CD9PF +-0.5% 50V	C404	0800003	EL 1MF 50V
C3514	0890113	CD9PF +-0.5% 50V	C4040	0880044	PF 0.01MF +-10% 50V
C3515	0244171	CD 0.01MF +80-20% 50V	C4041	0253943	EL 0.33MF 50V
C3516	0244171	CD 0.01MF +80-20% 50V	C4042	0800041	EL 47MF 16V
C3517	0244171	CD 0.01MF +80-20% 50V	C4043	0800003	EL 1MF 50V
C3518	0244171	CD 0.01MF +80-20% 50V	C4044	0253943	EL 0.33MF 50V
C3519	0800003	EL 1MF 50V	C4045	0880044	PF 0.01MF +-10% 50V
C3520	0800003	EL 1MF 50V	C4046	0800015	EL 10MF 16V
C3521	0800015	EL 10MF 16V	C4047	0800049	EL 100MF 16V
C3522	0800003	EL 1MF 50V	C4048	0800049	EL 100MF 16V
C3523	0800015	EL 10MF 16V	C405	0244105	CD 2200PF +-10% 50V
C3524	0800015	EL 10MF 16V	C4054	0800015	EL 10MF 16V
C3525	0244171	CD 0.01MF +80-20% 50V	C4055	0800015	EL 10MF 16V
C3526	0244171	CD 0.01MF +80-20% 50V	C4056	0890069	CD47PF +-5% 50V
C3527	0244171	CD 0.01MF +80-20% 50V	C4057	0890069	CD47PF +-5% 50V
C3528	0244171	CD 0.01MF +80-20% 50V	C4058	0800048	EL 100MF 10V
C3530	0800023	EL 22MF 16V	C4059	0292712F	TA 3.3MF 16V
C3531	0800015	EL 10MF 16V	C406	0244105	CD 2200PF +-10% 50V
C3532	0800015	EL 10MF 16V	C4060	0880057	PF 0.1MF +-10% 50V
C3534	0244171	CD 0.01MF +80-20% 50V	C4061	0800041	EL 47MF 16V
C3536	0890087	CD1000PF +-10% 50V	C4062	0800009	EL 4.7MF 25V
C3537	0800015	EL 10MF 16V	C4063	0800009	EL 4.7MF 25V
C3538	0880057	PF 0.1MF +-10% 50V	C4066	0800015	EL 10MF 16V
C3539	0890075	CD120PF 50V +-5%	C4067	0800015	EL 10MF 16V
C3540	0800049	EL 100MF 16V	C4068	0800015	EL 10MF 16V
C4001	0800009	EL 4.7MF 25V	C4069	0800015	EL 10MF 16V
C4002	0880057	PF 0.1MF +-10% 50V	C4071	0800074	EL 470MF 16V
C4003	0880044	PF 0.01MF +-10% 50V	C4072	0800015	EL 10MF 16V
C4004	0800001	EL 0.47MF 50V	C4073	0800015	EL 10MF 16V
C4005	0800074	EL 470MF 16V	C4075	0800015	EL 10MF 16V
C4006	0800001	EL 0.47MF 50V	C4077	0800015	EL 10MF 16V
C4007	0800001	EL 0.47MF 50V	C408	0800051	EL 100MF 25V
C4008	0800009	EL 4.7MF 25V	C409	0800042	EL 47MF 25V
C4009	0800001	EL 0.47MF 50V	C412	0800042	EL 47MF 25V
C4010	0800005	EL 2.2MF 50V	C414	0880057	PF 0.1MF +-10% 50V
C4011	0800007	EL 3.3MF 50V	C416	0880057	PF 0.1MF +-10% 50V
C4012	0800001	EL 0.47MF 50V	C417	0800084	EL 1000MF 35V
C4013	0800001	EL 0.47MF 50V	C418	0258192F	EL 2200MF 25V
C4014	0292714F	TA 10MF +-10% 16V	C420	0258192F	EL 2200MF 25V
C4015	0800015	EL 10MF 16V	C421	0880062	PF 0.22MF +-10% 50V
C4016	0800009	EL 4.7MF 25V	C422	0800042	EL 47MF 25V
C4017	0800003	EL 1MF 50V	C424	0800051	EL 100MF 25V
C4018	0880059	PF 0.15MF 50V	C425	0244171	CD 0.01MF +80-20% 50V
C4019	0800003	EL 1MF 50V	C427	0800087	EL 2200MF 16V

PRODUCT SAFETY NOTE: Components marked with a ⚠ have special characteristics important to safety. Before replacing any of these components, read carefully, the PRODUCT SAFETY NOTICE of this Service Manual. Don't degrade the safety of the receiver through improper servicing.

SYMBOL NO.	PART NO.	PART DESCRIPTION	SYMBOL NO.	PART NO.	PART DESCRIPTION
C428	0800087	EL 2200MF 16V	C604	0800023	EL 22MF 16V
C430	0800003	EL 1MF 50V	C605	0284647R	EL 22MF 16V
C434	0800003	EL 1MF 50V	C606	0800003	EL 1MF 50V
C435	0800015	EL 10MF 16V	C608	0284446R	EL 1MF 50V
C436	0800003	EL 1MF 50V	C609	0284446R	EL 1MF 50V
C437	0880057	PF 0.1MF +-10% 50V	C610	0880062	PF 0.22MF +-10% 50V
C5001	0800049	EL 100MF 16V	C611	0800041	EL 47MF 16V
C5002	0800015	EL 10MF 16V	C612	0284647R	EL 22MF 16V
C5003	0800049	EL 100MF 16V	C613	0244109	CD 4700PF +-10% 50V
C5004	0890122R	CD39PF +-5% 50V	C620	0800003	EL 1MF 50V
C5005	0880044	PF 0.01MF +-10% 50V	C621	0284449R	EL 4.7MF 50V
C5006	0246462	CD 82PF +-10% 50V	C630	0800015	EL 10MF 16V
C5007	0244171	CD 0.01MF +80-20% 50V	C631	0880062	PF 0.22MF +-10% 50V
C5008	0800049	EL 100MF 16V	C632	0800015	EL 10MF 16V
C5009	0800049	EL 100MF 16V	C633	0800015	EL 10MF 16V
C5010	0800041	EL 47MF 16V	C651	0279859	PF 0.1MF +-10% 100V
C5503	0244171	CD 0.01MF +80-20% 50V	C652	0880051	PF 0.033MF +-10% 50V
C5504	0246448	CD 22PF +-5% 50V	C653	0880044	PF 0.01MF +-10% 50V
C5505	0800009	EL 4.7MF 25V	C654	0800069	EL 330MF 50V
C5506	0800049	EL 100MF 16V	C655	0252969	EL 2200MF 25V
C5507	0244171	CD 0.01MF +80-20% 50V	C656	0800069	EL 330MF 50V
C5508	0800049	EL 100MF 16V	C658	0800049	EL 100MF 16V
C5510	0800049	EL 100MF 16V	C659	0284446R	EL 1MF 50V
C5511	0800003	EL 1MF 50V	⚠C660	0298261R	TA 1MF +-10% 35V
C5512	0800003	EL 1MF 50V	C664	0800067	EL 330MF 25V
C5513	0800003	EL 1MF 50V	C665	0800015	EL 10MF 16V
C5514	0244171	CD 0.01MF +80-20% 50V	C668	0880044	PF 0.01MF +-10% 50V
C5515	0244171	CD 0.01MF +80-20% 50V	C669	0800043	EL 47MF 35V
C5516	0890116	CD15PF +-5% 50V	C701	0880044	PF 0.01MF +-10% 50V
C5517	0800001	EL 0.47MF 50V	C711	0299926	PP 0.1MF +-10% 200V
C5518	0244171	CD 0.01MF +80-20% 50V	C713	0244501	CD 1000PF +-10% 500V
C5519	0244171	CD 0.01MF +80-20% 50V	C714	0243507	CD 330PF +-10% 500V
C5520	0244171	CD 0.01MF +80-20% 50V	C715	0890028	CD330PF +-10% 50V
C5521	0244171	CD 0.01MF +80-20% 50V	⚠C716	0299931	PP 0.27MF +-10% 200V
C5522	0244171	CD 0.01MF +80-20% 50V	⚠C717	0262426F	PP 9100PF +-5% 1.8KV
C5523	0244171	CD 0.01MF +80-20% 50V	⚠C718	0262415F	PP 3600PF +-5% 1.8KV
C5524	0244171	CD 0.01MF +80-20% 50V	⚠C719	0299929	PP 0.18MF +-10% 200V
C5525	0800015	EL 10MF 16V	⚠C720	0299929	PP 0.18MF +-10% 200V
C5526	0244107	CD 3300PF +-10% 50V	⚠C721	0299918	PP 0.022MF +-10% 200V
C5527	0244171	CD 0.01MF +80-20% 50V	C722	0259473	EL 6.8MF 25V
C5529	0800003	EL 1MF 50V	⚠C723	0244211F	CD 1000PF +-10% 2KV
C5530	0890079R	CD270PF +-10% 50V	C724	0259153	EL 220MF 160V
C5531	0890087	CD1000PF +-10% 50V	C726	0284634R	EL 4.7MF 50V
C5533	0880047	PF 0.018MF +-10% 50V	C727	0244504	CD 1800PF +-10% 500V
C5535	0800005	EL 2.2MF 50V	C729	0253983F	EL 33MF
C5536	0800003	EL 1MF 50V	C731	0800053	EL 100MF 50V
C5538	0800049	EL 100MF 16V	C732	0299636	PP 0.068MF +-5% 1600V
C5539	0244171	CD 0.01MF +80-20% 50V	C738	0243510	CD 560PF +-10% 500V
C5540	0800003	EL 1MF 50V	C739	0800018	EL 10MF 50V
C5545	0880057	PF 0.1MF +-10% 50V	C743	0800003	EL 1MF 50V
C5546	0800049	EL 100MF 16V	C744	0880048	PF 0.022MF +-10% 50V
C5547	0244171	CD 0.01MF +80-20% 50V	C745	0880057	PF 0.1MF +-10% 50V
C5548	0800058	EL 220MF 16V	C750	0890087	CD1000PF +-10% 50V
C5549	0880057	PF 0.1MF +-10% 50V	C752	0890084	CD560PF +-10% 50V

PRODUCT SAFETY NOTE: Components marked with a ⚠ have special characteristics important to safety. Before replacing any of these components, read carefully, the PRODUCT SAFETY NOTICE of this Service Manual. Don't degrade the safety of the receiver through improper servicing.

SYMBOL NO.	PART NO.	PART DESCRIPTION	SYMBOL NO.	PART NO.	PART DESCRIPTION
C753	0880051	PF 0.033MF +-10% 50V	C933	0800049	EL 100MF 16V
C755	0244109	CD 4700PF +-10% 50V	C942	0880044	PF 0.01MF +-10% 50V
C760	0243503	CD 150PF +-10% 500V	C943	0244105	CD 2200PF +-10% 50V
C763	0890089	CD1500PF +-10% 50V	C944	0258178G	EL 470MF,63V
C770	0890082R	CD390PF +-10% 50V	C945	0284439	EL 470MF 35V
C771	0880044	PF 0.01MF +-10% 50V	C947	0800043	EL 47MF 35V
C772	0800015	EL 10MF 16V	C948	0800043	EL 47MF 35V
C773	0284642R	EL 10MF 50V	C949	0258178G	EL 470MF,63V
C775	0880041	PF 5600PF +-10% 50V	C950	0284439F	EL 470MF 35V
C776	0890083	CD470PF +-10% 50V	C952	0880057	PF 0.1MF +-10% 50V
C781	0800041	EL 47MF 16V	C953	0880057	PF 0.1MF +-10% 50V
C790	0800074	EL 470MF 16V	C954	0800042	EL 47MF 25V
C791	0800074	EL 470MF 16V	C956	0258175	EL 470MF 31.5V
C792	0252396	EL 10MF 16V	C957	0258179G	EL 1000MF,6
C793	0800015	EL 10MF 16V	C958	0258175	EL 470MF 31.5V
C794	0244109	CD 4700PF +-10% 50V	C959	0800044	EL 47MF 50V
C795	0284449R	EL 4.7MF 50V	C960	0880057	PF 0.1MF +-10% 50V
C796	0800041	EL 47MF 16V	C981	0880057	PF 0.1MF +-10% 50V
C797	0800049	EL 100MF 16V	C982	0800018	EL 10MF 50V
C801G	0257543	EL 3.3MF 315V	C983	0800044	EL 47MF 50V
C804B	0244889	CD 2200PF +-10% 2KV	C984	0258697	EL 470MF 160V
C804G	0244889	CD 2200PF +-10% 2KV	C985	0800041	EL 47MF 16V
C804R	0244889	CD 2200PF +-10% 2KV	C986	0800023	EL 22MF 16V
C805B	0800326	EL 100MF 16V	C987	0800003	EL 1MF 50V
C805G	0800326	EL 100MF 16V	C989	0800003	EL 1MF 50V
C805R	0800326	EL 100MF 16V	C990	0800082	EL 1000MF 16V
C806B	0244501	CD 1000PF +-10% 500V	C991	0258121R	EL 2.2MF 100V
C807B	0244105	CD 2200PF +-10% 50V	C992	0880044	PF 0.01MF +-10% 50V
C807G	0244105	CD 2200PF +-10% 50V	C994	0800079	EL 1000MF 6.3V
C807R	0244105	CD 2200PF +-10% 50V			
C808B	0244120	CD 820PF +-10% 50V			**RESISTORS**
C808G	0244102	CD 1200PF +-10% 50V			
C808R	0244139	CD 1000PF +-10% 50V	R0001	0700041	CF 1K OHM +-5% 1/16W
C809B	0244227	CD 100PF +-10% 50V	R0002	0700041	CF 1K OHM +-5% 1/16W
⚠C901	0279718	PF 0.1MF +-10% 125V	R0003	0700058	CF 22K OHM +-5% 1/16W
⚠C902	0279718	PF 0.1MF +-10% 125V	R0004	0700041	CF 1K OHM +-5% 1/16W
⚠C903	0248593F	CD 4700PF +80-20% 250V	R0005	0700041	CF 1K OHM +-5% 1/16W
⚠C904	0248593F	CD 4700PF +80-20% 250V	R0006	0700049	CF 4.7K OHM +-5% 1/16W
⚠C905	0248593F	CD 4700PF +80-20% 250V	R0008	0700055	CF 12K OHM +-5% 1/16W
⚠C906	0248593F	CD 4700PF +80-20% 250V	R0009	0700055	CF 12K OHM +-5% 1/16W
C907	0259167	EL 820MF 200V	R0010	0700055	CF 12K OHM +-5% 1/16W
C908	0259167	EL 820MF 200V	R0011	0700056	CF 15K OHM +-5% 1/16W
⚠C909	0249486	CD 2200PF +-20%	R0015	0700051	CF 5.6K OHM +-5% 1/16W
C911	0890087	CD1000PF +-10% 50V	R0016	0700051	CF 5.6K OHM +-5% 1/16W
C912	0800061	EL 220MF 35V	R0017	0700049	CF 4.7K OHM +-5% 1/16W
C913	0880044	PF 0.01MF +-10% 50V	R0018	0700053	CF 8.2K OHM +-5% 1/16W
C914	0880035	PF 2200PF +-10% 50V	R0019	0700055	CF 12K OHM +-5% 1/16W
C915	0880044	PF 0.01MF +-10% 50V	R0031	0700041	CF 1K OHM +-5% 1/16W
C916	0299981	PP 0.01MF +-5% 630V	R0032	0700067	CF 100K OHM +-5% 1/16W
C917	0880031	PF 1000PF +-10% 50V	R0033	0700027	CF 100 OHM +-5% 1/16W
C918	0800009	EL 4.7MF 25V	R0034	0700041	CF 1K OHM +-5% 1/16W
⚠C920	0249487	CD 3300PF +-20%	R0035	0700067	CF 100K OHM +-5% 1/16W
C931	0800075	EL 470MF 25V	R0036	0700041	CF 1K OHM +-5% 1/16W
C932	0800015	EL 10MF 16V	R0037	0700067	CF 100K OHM +-5% 1/16W

PRODUCT SAFETY NOTE: Components marked with a ⚠ have special characteristics important to safety. Before replacing any of these components, read carefully, the PRODUCT SAFETY NOTICE of this Service Manual. Don't degrade the safety of the receiver through improper servicing.

SYMBOL NO.	PART NO.	PART DESCRIPTION	SYMBOL NO.	PART NO.	PART DESCRIPTION
R0038	0700041	CF 1K OHM +-5% 1/16W	R0097	0700058	CF 22K OHM +-5% 1/16W
R0039	0700058	CF 22K OHM +-5% 1/16W	R0098	0700041	CF 1K OHM +-5% 1/16W
R0040	0700067	CF 100K OHM +-5% 1/16W	R0099	0700041	CF 1K OHM +-5% 1/16W
R0041	0700041	CF 1K OHM +-5% 1/16W	R0100	0700045	CF 2.2K OHM +-5% 1/16W
R0042	0700067	CF 100K OHM +-5% 1/16W	R0101	0700041	CF 1K OHM +-5% 1/16W
R0043	0700041	CF 1K OHM +-5% 1/16W	R0102	0700058	CF 22K OHM +-5% 1/16W
R0044	0700067	CF 100K OHM +-5% 1/16W	R0103	0700041	CF 1K OHM +-5% 1/16W
R0045	0700041	CF 1K OHM +-5% 1/16W	R0104	0700041	CF 1K OHM +-5% 1/16W
R0046	0700067	CF 100K OHM +-5% 1/16W	R0105	0700041	CF 1K OHM +-5% 1/16W
R0047	0700041	CF 1K OHM +-5% 1/16W	R0106	0700041	CF 1K OHM +-5% 1/16W
R0048	0700067	CF 100K OHM +-5% 1/16W	R0107	0700051	CF 5.6K OHM +-5% 1/16W
R0049	0700041	CF 1K OHM +-5% 1/16W	R0108	0700041	CF 1K OHM +-5% 1/16W
R0050	0700067	CF 100K OHM +-5% 1/16W	R0109	0700051	CF 5.6K OHM +-5% 1/16W
R0051	0700041	CF 1K OHM +-5% 1/16W	R0110	0700041	CF 1K OHM +-5% 1/16W
R0052	0700067	CF 100K OHM +-5% 1/16W	R0111	0700041	CF 1K OHM +-5% 1/16W
R0053	0700041	CF 1K OHM +-5% 1/16W	R0112	0700041	CF 1K OHM +-5% 1/16W
R0054	0700049	CF 4.7K OHM +-5% 1/16W	R0113	0700041	CF 1K OHM +-5% 1/16W
R0055	0700045	CF 2.2K OHM +-5% 1/16W	R0114	0700058	CF 22K OHM +-5% 1/16W
R0056	0700051	CF 5.6K OHM +-5% 1/16W	R0115	0700058	CF 22K OHM +-5% 1/16W
R0057	0700064	CF 56K OHM +-5% 1/16W	R0116	0700041	CF 1K OHM +-5% 1/16W
R0059	0700049	CF 4.7K OHM +-5% 1/16W	R0117	0700041	CF 1K OHM +-5% 1/16W
R0060	0700049	CF 4.7K OHM +-5% 1/16W	R0118	0700041	CF 1K OHM +-5% 1/16W
R0061	0700058	CF 22K OHM +-5% 1/16W	R0120	0700027	CF 100 OHM +-5% 1/16W
R0062	0700067	CF 100K OHM +-5% 1/16W	R0121	0700027	CF 100 OHM +-5% 1/16W
R0063	0700031	CF 180 OHM +-5% 1/16W	R0122	0700041	CF 1K OHM +-5% 1/16W
R0064	0700066	CF 82K OHM +-5% 1/16W	R0123	0700041	CF 1K OHM +-5% 1/16W
R0065	0700064	CF 56K OHM +-5% 1/16W	R0124	0700041	CF 1K OHM +-5% 1/16W
R0067	0700066	CF 82K OHM +-5% 1/16W	R0125	0700041	CF 1K OHM +-5% 1/16W
R0068	0700063	CF 47K OHM +-5% 1/16W	R0126	0700065	CF 68K OHM +-5% 1/16W
R0069	0700054	CF 10K OHM +-5% 1/16W	R0127	0119635	MF 15K OHM +-1% 1/8W
R0070	0700041	CF 1K OHM +-5% 1/16W	R0128	0700034	CF 330 OHM +-5% 1/16W
R0071	0700058	CF 22K OHM +-5% 1/16W	R0129	0700037	CF 560 OHM +-5% 1/16W
R0073	0700041	CF 1K OHM +-5% 1/16W	R0130	0700057	CF 18K OHM +-5% 1/16W
R0074	0700067	CF 100K OHM +-5% 1/16W	R0131	0700027	CF 100 OHM +-5% 1/16W
R0075	0700041	CF 1K OHM +-5% 1/16W	R0132	0700022	CF 39 OHM +-5% 1/16W
R0076	0700067	CF 100K OHM +-5% 1/16W	R0133	0100065	CF 1K OHM +-5% 1/8W
R0077	0700041	CF 1K OHM +-5% 1/16W	R0136	0700064	CF 56K OHM +-5% 1/16W
R0078	0700067	CF 100K OHM +-5% 1/16W	R0137	0700041	CF 1K OHM +-5% 1/16W
R0079	0700041	CF 1K OHM +-5% 1/16W	R0138	0700041	CF 1K OHM +-5% 1/16W
R0081	0700041	CF 1K OHM +-5% 1/16W	R0139	0700041	CF 1K OHM +-5% 1/16W
R0082	0700041	CF 1K OHM +-5% 1/16W	R0140	0700041	CF 1K OHM +-5% 1/16W
R0083	0700041	CF 1K OHM +-5% 1/16W	R0141	0700054	CF 10K OHM +-5% 1/16W
R0084	0700041	CF 1K OHM +-5% 1/16W	R0146	0100053	CF 330 OHM +-5% 1/8W
R0086	0700041	CF 1K OHM +-5% 1/16W	R0151	0100067	CF 1.2K OHM +-5% 1/8W
R0087	0700041	CF 1K OHM +-5% 1/16W	R0152	0700041	CF 1K OHM +-5% 1/16W
R0088	0700041	CF 1K OHM +-5% 1/16W	R0153	0700041	CF 1K OHM +-5% 1/16W
R0089	0700041	CF 1K OHM +-5% 1/16W	R0154	0700041	CF 1K OHM +-5% 1/16W
R0090	0700041	CF 1K OHM +-5% 1/16W	R0155	0700041	CF 1K OHM +-5% 1/16W
R0091	0700041	CF 1K OHM +-5% 1/16W	R0159	0700041	CF 1K OHM +-5% 1/16W
R0092	0700041	CF 1K OHM +-5% 1/16W	R0161	0700056	CF 15K OHM +-5% 1/16W
R0093	0700041	CF 1K OHM +-5% 1/16W	R0162	0700051	CF 5.6K OHM +-5% 1/16W
R0094	0700041	CF 1K OHM +-5% 1/16W	R0163	0700056	CF 15K OHM +-5% 1/16W
R0095	0700041	CF 1K OHM +-5% 1/16W	R0164	0700054	CF 10K OHM +-5% 1/16W
R0096	0700049	CF 4.7K OHM +-5% 1/16W	R0165	0700061	CF 33K OHM +-5% 1/16W

PRODUCT SAFETY NOTE: Components marked with a ⚠ have special characteristics important to safety. Before replacing any of these components, read carefully, the PRODUCT SAFETY NOTICE of this Service Manual. Don't degrade the safety of the receiver through improper servicing.

SYMBOL NO.	PART NO.	PART DESCRIPTION	SYMBOL NO.	PART NO.	PART DESCRIPTION
R0166	0700066	CF 82K OHM +-5% 1/16W	R0518	0187074	CF 2.4K OHM +-5% 1/16W
R0167	0700054	CF 10K OHM +-5% 1/16W	R0519	0187080	CF 4.3K OHM +-5% 1/16W
R0168	0100065	CF 1K OHM +-5% 1/8W	R0520	0100065	CF 1K OHM +-5% 1/8W
R0169	0700064	CF 56K OHM +-5% 1/16W	R0521	0114149	CF 560 OHM +-5% 1/4W
R0170	0100097	CF 22K OHM +-5% 1/8W	R0530	0100115	CF 120K OHM +-5% 1/8W
R0171	0100066	CF 1.1K OHM +-5% 1/8W	R0531	0700046	CF 2.7K OHM +-5% 1/16W
R0172	0100041	CF 100 OHM +-5% 1/8W	R0532	0700052	CF 6.8K OHM +-5% 1/16W
R0173	0100065	CF 1K OHM +-5% 1/8W	R0533	0700044	CF 1.8K OHM +-5% 1/16W
R0174	0100065	CF 1K OHM +-5% 1/8W	R0536	0700057	CF 18K OHM +-5% 1/16W
R0180	0100065	CF 1K OHM +-5% 1/8W	R0537	0100121	CF 220K OHM +-5% 1/8W
R0182	0700022	CF 39 OHM +-5% 1/16W	R0538	0700061	CF 33K OHM +-5% 1/16W
R0186	0700051	CF 5.6K OHM +-5% 1/16W	R0539	0700041	CF 1K OHM +-5% 1/16W
R0187	0700041	CF 1K OHM +-5% 1/16W	R0968	0700054	CF 10K OHM +-5% 1/16W
R0188	0150287	VR 10K OHM-B	R1101	0700063	CF 47K OHM +-5% 1/16W
R0189	0700054	CF 10K OHM +-5% 1/16W	R1102	0700054	CF 10K OHM +-5% 1/16W
R0190	0700054	CF 10K OHM +-5% 1/16W	R1103	0700058	CF 22K OHM +-5% 1/16W
R0191	0700054	CF 10K OHM +-5% 1/16W	R1104	0700041	CF 1K OHM +-5% 1/16W
R0192	0700054	CF 10K OHM +-5% 1/16W	R1301	0700063	CF 47K OHM +-5% 1/16W
R0193	0700054	CF 10K OHM +-5% 1/16W	R1302	0110229	MF 220 OHM +-5% 2W
R0194	0700054	CF 10K OHM +-5% 1/16W	R1303	0113696	CF 6.8 OHM +-5% 1/2W
R0195	0700054	CF 10K OHM +-5% 1/16W	R1304	0113696	CF 6.8 OHM +-5% 1/2W
R0196	0700058	CF 22K OHM +-5% 1/16W	R1306	0100077	CF 3.3K OHM +-5% 1/8W
R0197	0700058	CF 22K OHM +-5% 1/16W	R1311	0700063	CF 47K OHM +-5% 1/16W
R0198	0700058	CF 22K OHM +-5% 1/16W	R1312	0110225	MF 150 OHM +-5% 2W
R0199	0700058	CF 22K OHM +-5% 1/16W	R1313	0113692	CF 4.7 OHM +-5% 1/2W
R0200	0700041	CF 1K OHM +-5% 1/16W	R1314	0113692	CF 4.7 OHM +-5% 1/2W
R0202	0700066	CF 82K OHM +-5% 1/16W	R1316	0100077	CF 3.3K OHM +-5% 1/8W
R0203	0187064	CF 910 OHM +-5% 1/16W	R1326	0700063	CF 47K OHM +-5% 1/16W
R0204	0700061	CF 33K OHM +-5% 1/16W	R1327	0110229	MF 220 OHM +-5% 2W
R0205	0700061	CF 33K OHM +-5% 1/16W	R1328	0113696	CF 6.8 OHM +-5% 1/2W
R0206	0700061	CF 33K OHM +-5% 1/16W	R1329	0113696	CF 6.8 OHM +-5% 1/2W
R0207	0700063	CF 47K OHM +-5% 1/16W	R1331	0100077	CF 3.3K OHM +-5% 1/8W
R0211	0700058	CF 22K OHM +-5% 1/16W	R1336	0700063	CF 47K OHM +-5% 1/16W
R0212	0700058	CF 22K OHM +-5% 1/16W	R1337	0110225	MF 150 OHM +-5% 2W
R0213	0700049	CF 4.7K OHM +-5% 1/16W	R1338	0113698	CF 8.2 OHM +-5% 1/2W
R0214	0114149	CF 560 OHM +-5% 1/4W	R1339	0113698	CF 8.2 OHM +-5% 1/2W
R0215	0700058	CF 22K OHM +-5% 1/16W	R1341	0100077	CF 3.3K OHM +-5% 1/8W
R0216	0700054	CF 10K OHM +-5% 1/16W	R1351	0700063	CF 47K OHM +-5% 1/16W
R0220	0700055	CF 12K OHM +-5% 1/16W	R1352	0110229	MF 220 OHM +-5% 2W
R0223	0700041	CF 1K OHM +-5% 1/16W	R1353	0113696	CF 6.8 OHM +-5% 1/2W
R0225	0700054	CF 10K OHM +-5% 1/16W	R1354	0113696	CF 6.8 OHM +-5% 1/2W
R0229	0100121	CF 220K OHM +-5% 1/8W	R1356	0100077	CF 3.3K OHM +-5% 1/8W
R0232	0700058	CF 22K OHM +-5% 1/16W	R1361	0700063	CF 47K OHM +-5% 1/16W
R0233	0700041	CF 1K OHM +-5% 1/16W	R1362	0110225	MF 150 OHM +-5% 2W
R0501	0700041	CF 1K OHM +-5% 1/16W	R1363	0113692	CF 4.7 OHM +-5% 1/2W
R0502	0700058	CF 22K OHM +-5% 1/16W	R1364	0113692	CF 4.7 OHM +-5% 1/2W
R0503	0700045	CF 2.2K OHM +-5% 1/16W	R1366	0100077	CF 3.3K OHM +-5% 1/8W
R0504	0100065	CF 1K OHM +-5% 1/8W	R1370	0700032	CF 220 OHM +-5% 1/16W
R0510	0100125	CF 330K OHM +-5% 1/8W	R1371	0700032	CF 220 OHM +-5% 1/16W
R0511	0700041	CF 1K OHM +-5% 1/16W	R1372	0700032	CF 220 OHM +-5% 1/16W
R0512	0100125	CF 330K OHM +-5% 1/8W	R1373	0700032	CF 220 OHM +-5% 1/16W
R0513	0100129	CF 470K OHM +-5% 1/8W	R1374	0700032	CF 220 OHM +-5% 1/16W
R0516	0700041	CF 1K OHM +-5% 1/16W	R1375	0700032	CF 220 OHM +-5% 1/16W
R0517	0700043	CF 1.5K OHM +-5% 1/16W	R1376	0700032	CF 220 OHM +-5% 1/16W

PRODUCT SAFETY NOTE: Components marked with a ⚠ have special characteristics important to safety. Before replacing any of these components, read carefully, the PRODUCT SAFETY NOTICE of this Service Manual. Don't degrade the safety of the receiver through improper servicing.

SYMBOL NO.	PART NO.	PART DESCRIPTION
R1377	0700032	CF 220 OHM +-5% 1/16W
R1378	0700032	CF 220 OHM +-5% 1/16W
R1379	0700032	CF 220 OHM +-5% 1/16W
R1501	0700044	CF 1.8K OHM +-5% 1/16W
R1503	0700041	CF 1K OHM +-5% 1/16W
R1504	0700054	CF 10K OHM +-5% 1/16W
R1505	0700041	CF 1K OHM +-5% 1/16W
R1507	0700041	CF 1K OHM +-5% 1/16W
R1508	0700051	CF 5.6K OHM +-5% 1/16W
R1509	0700048	CF 3.9K OHM +-5% 1/16W
R1510	0700051	CF 5.6K OHM +-5% 1/16W
R1511	0700049	CF 4.7K OHM +-5% 1/16W
R1512	0700051	CF 5.6K OHM +-5% 1/16W
R1513	0700049	CF 4.7K OHM +-5% 1/16W
R1514	0700051	CF 5.6K OHM +-5% 1/16W
R1515	0700051	CF 5.6K OHM +-5% 1/16W
R1516	0700057	CF 18K OHM +-5% 1/16W
R1517	0700046	CF 2.7K OHM +-5% 1/16W
R1518	0700062	CF 39K OHM +-5% 1/16W
R1519	0700057	CF 18K OHM +-5% 1/16W
R1520	0700046	CF 2.7K OHM +-5% 1/16W
R1521	0700062	CF 39K OHM +-5% 1/16W
R1522	0700057	CF 18K OHM +-5% 1/16W
R1523	0700049	CF 4.7K OHM +-5% 1/16W
R1524	0700062	CF 39K OHM +-5% 1/16W
R1525	0700057	CF 18K OHM +-5% 1/16W
R1526	0700049	CF 4.7K OHM +-5% 1/16W
R1527	0700062	CF 39K OHM +-5% 1/16W
R1528	0700054	CF 10K OHM +-5% 1/16W
R2101	0150136	VR 5K OHM-B
R2102	0150136	VR 5K OHM-B
R2103	0150136	VR 5K OHM-B
R2104	0150136	VR 5K OHM-B
R2105	0150136	VR 5K OHM-B
R2106	0150136	VR 5K OHM-B
R2107	0150136	VR 5K OHM-B
R2108	0150136	VR 5K OHM-B
R2109	0150136	VR 5K OHM-B
R2110	0150136	VR 5K OHM-B
R2111	0150136	VR 5K OHM-B
R2112	0150136	VR 5K OHM-B
R2113	0150136	VR 5K OHM-B
R2114	0150136	VR 5K OHM-B
R2115	0150136	VR 5K OHM-B
R2116	0150136	VR 5K OHM-B
R2117	0150136	VR 5K OHM-B
R2118	0150136	VR 5K OHM-B
R2119	0150136	VR 5K OHM-B
R2120	0150136	VR 5K OHM-B
R2121	0150136	VR 5K OHM-B
R2122	0150136	VR 5K OHM-B
R2123	0150136	VR 5K OHM-B
R2124	0150136	VR 5K OHM-B
R2125	0150136	VR 5K OHM-B
R2126	0150136	VR 5K OHM-B
R2127	0150136	VR 5K OHM-B
R2128	0150136	VR 5K OHM-B
R2129	0150136	VR 5K OHM-B
R2130	0150136	VR 5K OHM-B
R2131	0150136	VR 5K OHM-B
R2132	0150136	VR 5K OHM-B
R2133	0150136	VR 5K OHM-B
R2134	0150136	VR 5K OHM-B
R2135	0150136	VR 5K OHM-B
R2136	0150136	VR 5K OHM-B
R2137	0150136	VR 5K OHM-B
R2138	0150136	VR 5K OHM-B
R2139	0150136	VR 5K OHM-B
R2140	0150136	VR 5K OHM-B
R2141	0150136	VR 5K OHM-B
R2142	0150136	VR 5K OHM-B
R2151	0700044	CF 1.8K OHM +-5% 1/16W
R2152	0700046	CF 2.7K OHM +-5% 1/16W
R2153	0700048	CF 3.9K OHM +-5% 1/16W
R2154	0187092	CF 13K OHM+-5% 1/16W
R2155	0700049	CF 4.7K OHM +-5% 1/16W
R2156	0700047	CF 3.3K OHM +-5% 1/16W
R2157	0700052	CF 6.8K OHM +-5% 1/16W
R2158	0700054	CF 10K OHM +-5% 1/16W
R2162	0700054	CF 10K OHM +-5% 1/16W
R2163	0100121	CF 220K OHM +-5% 1/8W
R2164	0114161	CF 1K OHM +-5% 1/4W
R2165	0100087	CF 8.2K OHM +-5% 1/8W
R2166	0187072	CF 2K OHM +-5% 1/16W
R2167	0700049	CF 4.7K OHM +-5% 1/16W
R2168	0187068	CF 1.3K OHM +-5% 1/16W
R2169	0187080	CF 4.3K OHM +-5% 1/16W
R2170	0700055	CF 12K OHM +-5% 1/16W
R2171	0700047	CF 3.3K OHM +-5% 1/16W
R2172	0700047	CF 3.3K OHM +-5% 1/16W
R2173	0700065	CF 68K OHM +-5% 1/16W
R2174	0700054	CF 10K OHM +-5% 1/16W
R2175	0700047	CF 3.3K OHM +-5% 1/16W
R2177	0700047	CF 3.3K OHM +-5% 1/16W
R2178	0700054	CF 10K OHM +-5% 1/16W
R2179	0700047	CF 3.3K OHM +-5% 1/16W
R2180	0700055	CF 12K OHM +-5% 1/16W
R2182	0700051	CF 5.6K OHM +-5% 1/16W
R2183	0150134	VR 1K OHM-B
R2189	0700053	CF 8.2K OHM +-5% 1/16W
R2190	0700057	CF 18K OHM +-5% 1/16W
R2193	0150136	VR 5K OHM-B
R2194	0150136	VR 5K OHM-B
R2195	0150136	VR 5K OHM-B
R2196	0150136	VR 5K OHM-B
R2197	0700066	CF 82K OHM +-5% 1/16W
R2199	0187104	CF 43K OHM +-5% 1/16W
R2200	0700054	CF 10K OHM +-5% 1/16W

PRODUCT SAFETY NOTE: Components marked with a ⚠ have special characteristics important to safety. Before replacing any of these components, read carefully, the PRODUCT SAFETY NOTICE of this Service Manual. Don't degrade the safety of the receiver through improper servicing.

SYMBOL NO.	PART NO.	PART DESCRIPTION
R2201	0700052	CF 6.8K OHM +-5% 1/16W
R2205	0700067	CF 100K OHM +-5% 1/16W
R2206	0187098	CF 24K OHM +-5% 1/16W
R2208	0700049	CF 4.7K OHM +-5% 1/16W
R2209	0700049	CF 4.7K OHM +-5% 1/16W
R2210	0700047	CF 3.3K OHM +-5% 1/16W
R2211	0700054	CF 10K OHM +-5% 1/16W
R2212	0700048	CF 3.9K OHM +-5% 1/16W
R2213	0700041	CF 1K OHM +-5% 1/16W
R2217	0700049	CF 4.7K OHM +-5% 1/16W
R2218	0700044	CF 1.8K OHM +-5% 1/16W
R2219	0700067	CF 100K OHM +-5% 1/16W
R2220	0114161	CF 1K OHM +-5% 1/4W
R2221	0700046	CF 2.7K OHM +-5% 1/16W
R2222	0700052	CF 6.8K OHM +-5% 1/16W
R2223	0700048	CF 3.9K OHM +-5% 1/16W
R2224	0700048	CF 3.9K OHM +-5% 1/16W
R2225	0187086	CF 7.5K OHM +-5% 1/16W
R2226	0700048	CF 3.9K OHM +-5% 1/16W
R2227	0700051	CF 5.6K OHM +-5% 1/16W
R2228	0700045	CF 2.2K OHM +-5% 1/16W
R2229	0700043	CF 1.5K OHM +-5% 1/16W
R2230	0700056	CF 15K OHM +-5% 1/16W
R2231	0700041	CF 1K OHM +-5% 1/16W
R2232	0700054	CF 10K OHM +-5% 1/16W
R2233	0700044	CF 1.8K OHM +-5% 1/16W
R2234	0700045	CF 2.2K OHM +-5% 1/16W
R2235	0700054	CF 10K OHM +-5% 1/16W
R2236	0700049	CF 4.7K OHM +-5% 1/16W
R2237	0700045	CF 2.2K OHM +-5% 1/16W
R2238	0700066	CF 82K OHM +-5% 1/16W
R2239	0700048	CF 3.9K OHM +-5% 1/16W
R2240	0700052	CF 6.8K OHM +-5% 1/16W
R2241	0700054	CF 10K OHM +-5% 1/16W
R2242	0700061	CF 33K OHM +-5% 1/16W
R2243	0700041	CF 1K OHM +-5% 1/16W
R2244	0700047	CF 3.3K OHM +-5% 1/16W
R2245	0700051	CF 5.6K OHM +-5% 1/16W
R2246	0700046	CF 2.7K OHM +-5% 1/16W
R2247	0700063	CF 47K OHM +-5% 1/16W
R2250	0700067	CF 100K OHM +-5% 1/16W
R2251	0700058	CF 22K OHM +-5% 1/16W
R2252	0700061	CF 33K OHM +-5% 1/16W
R2253	0700042	CF 1.2K OHM +-5% 1/16W
R2254	0700049	CF 4.7K OHM +-5% 1/16W
R2255	0700051	CF 5.6K OHM +-5% 1/16W
R2256	0700042	CF 1.2K OHM +-5% 1/16W
R2257	0700046	CF 2.7K OHM +-5% 1/16W
R2258	0700052	CF 6.8K OHM +-5% 1/16W
R2259	0700045	CF 2.2K OHM +-5% 1/16W
R2260	0700042	CF 1.2K OHM +-5% 1/16W
R2261	0700047	CF 3.3K OHM +-5% 1/16W
R2262	0700047	CF 3.3K OHM +-5% 1/16W
R2263	0700054	CF 10K OHM +-5% 1/16W
R2264	0700047	CF 3.3K OHM +-5% 1/16W
R2265	0700058	CF 22K OHM +-5% 1/16W
R2266	0700046	CF 2.7K OHM +-5% 1/16W
R2267	0700053	CF 8.2K OHM +-5% 1/16W
R2268	0700054	CF 10K OHM +-5% 1/16W
R2269	0700054	CF 10K OHM +-5% 1/16W
R2270	0700047	CF 3.3K OHM +-5% 1/16W
R2271	0700048	CF 3.9K OHM +-5% 1/16W
R2272	0700063	CF 47K OHM +-5% 1/16W
R2273	0700067	CF 100K OHM +-5% 1/16W
R2274	0700062	CF 39K OHM +-5% 1/16W
R2275	0700048	CF 3.9K OHM +-5% 1/16W
R2276	0700051	CF 5.6K OHM +-5% 1/16W
R2277	0700048	CF 3.9K OHM +-5% 1/16W
R2278	0700042	CF 1.2K OHM +-5% 1/16W
R2279	0700041	CF 1K OHM +-5% 1/16W
R2280	0700054	CF 10K OHM +-5% 1/16W
R2281	0700054	CF 10K OHM +-5% 1/16W
R2282	0700046	CF 2.7K OHM +-5% 1/16W
R2283	0700048	CF 3.9K OHM +-5% 1/16W
R2284	0700052	CF 6.8K OHM +-5% 1/16W
R2285	0700045	CF 2.2K OHM +-5% 1/16W
R2286	0700052	CF 6.8K OHM +-5% 1/16W
R2287	0700066	CF 82K OHM +-5% 1/16W
R2288	0700045	CF 2.2K OHM +-5% 1/16W
R2289	0700052	CF 6.8K OHM +-5% 1/16W
R2290	0700054	CF 10K OHM +-5% 1/16W
R2291	0700027	CF 100 OHM +-5% 1/16W
R2292	0700047	CF 3.3K OHM +-5% 1/16W
R2293	0700046	CF 2.7K OHM +-5% 1/16W
R2294	0700049	CF 4.7K OHM +-5% 1/16W
R2295	0700063	CF 47K OHM +-5% 1/16W
R2298	0700042	CF 1.2K OHM +-5% 1/16W
R2299	0700049	CF 4.7K OHM +-5% 1/16W
R2300	0700051	CF 5.6K OHM +-5% 1/16W
R2301	0700042	CF 1.2K OHM +-5% 1/16W
R2302	0700046	CF 2.7K OHM +-5% 1/16W
R2303	0700052	CF 6.8K OHM +-5% 1/16W
R2304	0700045	CF 2.2K OHM +-5% 1/16W
R2305	0700048	CF 3.9K OHM +-5% 1/16W
R2306	0700049	CF 4.7K OHM +-5% 1/16W
R2307	0700067	CF 100K OHM +-5% 1/16W
R2308	0700049	CF 4.7K OHM +-5% 1/16W
R2309	0700044	CF 1.8K OHM +-5% 1/16W
R2310	0700052	CF 6.8K OHM +-5% 1/16W
R2311	0700058	CF 22K OHM +-5% 1/16W
R2312	0700061	CF 33K OHM +-5% 1/16W
R2313	0700046	CF 2.7K OHM +-5% 1/16W
R2314	0700052	CF 6.8K OHM +-5% 1/16W
R2315	0700054	CF 10K OHM +-5% 1/16W
R2316	0700047	CF 3.3K OHM +-5% 1/16W
R2317	0700047	CF 3.3K OHM +-5% 1/16W
R2318	0700049	CF 4.7K OHM +-5% 1/16W
R2319	0700053	CF 8.2K OHM +-5% 1/16W

PRODUCT SAFETY NOTE: Components marked with a ⚠ have special characteristics important to safety. Before replacing any of these components, read carefully, the PRODUCT SAFETY NOTICE of this Service Manual. Don't degrade the safety of the receiver through improper servicing.

SYMBOL NO.	PART NO.	PART DESCRIPTION
R2320	0700058	CF 22K OHM +-5% 1/16W
R2321	0700062	CF 39K OHM +-5% 1/16W
R2322	0700067	CF 100K OHM +-5% 1/16W
R2323	0700063	CF 47K OHM +-5% 1/16W
R2324	0700041	CF 1K OHM +-5% 1/16W
R2325	0700052	CF 6.8K OHM +-5% 1/16W
R2326	0700041	CF 1K OHM +-5% 1/16W
R2327	0700051	CF 5.6K OHM +-5% 1/16W
R2328	0700049	CF 4.7K OHM +-5% 1/16W
R2329	0700046	CF 2.7K OHM +-5% 1/16W
R2330	0700042	CF 1.2K OHM +-5% 1/16W
R2331	0700045	CF 2.2K OHM +-5% 1/16W
R2332	0700053	CF 8.2K OHM +-5% 1/16W
R2333	0700041	CF 1K OHM +-5% 1/16W
R2334	0700049	CF 4.7K OHM +-5% 1/16W
R2335	0700049	CF 4.7K OHM +-5% 1/16W
R2336	0700066	CF 82K OHM +-5% 1/16W
R2337	0187086	CF 7.5K OHM +-5% 1/16W
R2338	0700053	CF 8.2K OHM +-5% 1/16W
R2339	0700054	CF 10K OHM +-5% 1/16W
R2340	0700042	CF 1.2K OHM +-5% 1/16W
R2341	0700052	CF 6.8K OHM +-5% 1/16W
R2342	0700032	CF 220 OHM +-5% 1/16W
R2343	0700032	CF 220 OHM +-5% 1/16W
R2344	0700032	CF 220 OHM +-5% 1/16W
R2345	0700032	CF 220 OHM +-5% 1/16W
R2346	0700032	CF 220 OHM +-5% 1/16W
R2347	0700032	CF 220 OHM +-5% 1/16W
R2348	0700067	CF 100K OHM +-5% 1/16W
R2349	0700051	CF 5.6K OHM +-5% 1/16W
R2350	0700054	CF 10K OHM +-5% 1/16W
R2352	0700048	CF 3.9K OHM +-5% 1/16W
R2353	0700049	CF 4.7K OHM +-5% 1/16W
R2355	0700053	CF 8.2K OHM +-5% 1/16W
R2356	0700041	CF 1K OHM +-5% 1/16W
R2358	0700041	CF 1K OHM +-5% 1/16W
R2359	0700049	CF 4.7K OHM +-5% 1/16W
R2361	0100115	CF 120K OHM +-5% 1/8W
R2362	0700055	CF 12K OHM +-5% 1/16W
R2363	0700041	CF 1K OHM +-5% 1/16W
R2364	0700049	CF 4.7K OHM +-5% 1/16W
R2365	0700055	CF 12K OHM +-5% 1/16W
R2366	0700041	CF 1K OHM +-5% 1/16W
R2367	0700049	CF 4.7K OHM +-5% 1/16W
R2368	0700041	CF 1K OHM +-5% 1/16W
R2369	0700058	CF 22K OHM +-5% 1/16W
R2370	0700047	CF 3.3K OHM +-5% 1/16W
R2371	0700048	CF 3.9K OHM +-5% 1/16W
R2372	0150134	VR 1K OHM-B
R2373	0700047	CF 3.3K OHM +-5% 1/16W
R2374	0700055	CF 12K OHM +-5% 1/16W
R2375	0700047	CF 3.3K OHM +-5% 1/16W
R2376	0700056	CF 15K OHM +-5% 1/16W
R2377	0700055	CF 12K OHM +-5% 1/16W
R2378	0700065	CF 68K OHM +-5% 1/16W
R2379	0700041	CF 1K OHM +-5% 1/16W
R2380	0700049	CF 4.7K OHM +-5% 1/16W
R2381	0700041	CF 1K OHM +-5% 1/16W
R2383	0700041	CF 1K OHM +-5% 1/16W
R2384	0700049	CF 4.7K OHM +-5% 1/16W
R2388	0700041	CF 1K OHM +-5% 1/16W
R2389	0700041	CF 1K OHM +-5% 1/16W
R2390	0700052	CF 6.8K OHM +-5% 1/16W
R2391	0700062	CF 39K OHM +-5% 1/16W
R2392	0700041	CF 1K OHM +-5% 1/16W
R2393	0700044	CF 1.8K OHM +-5% 1/16W
R2394	0700053	CF 8.2K OHM +-5% 1/16W
R2396	0700041	CF 1K OHM +-5% 1/16W
R2397	0700054	CF 10K OHM +-5% 1/16W
R2398	0700054	CF 10K OHM +-5% 1/16W
R2399	0700043	CF 1.5K OHM +-5% 1/16W
R2400	0700049	CF 4.7K OHM +-5% 1/16W
R2401	0700041	CF 1K OHM +-5% 1/16W
R2402	0700041	CF 1K OHM +-5% 1/16W
R2403	0700066	CF 82K OHM +-5% 1/16W
R2404	0700056	CF 15K OHM +-5% 1/16W
R2405	0700054	CF 10K OHM +-5% 1/16W
R2406	0700047	CF 3.3K OHM +-5% 1/16W
R2407	0700047	CF 3.3K OHM +-5% 1/16W
R2408	0700041	CF 1K OHM +-5% 1/16W
R2409	0700041	CF 1K OHM +-5% 1/16W
R2410	0700066	CF 82K OHM +-5% 1/16W
R2411	0700056	CF 15K OHM +-5% 1/16W
R2419	0700062	CF 39K OHM +-5% 1/16W
R2420	0700054	CF 10K OHM +-5% 1/16W
R2421	0700054	CF 10K OHM +-5% 1/16W
R2422	0700055	CF 12K OHM +-5% 1/16W
R2423	0700053	CF 8.2K OHM +-5% 1/16W
R2424	0187110	CF 75K OHM +-5% 1/16W
R2425	0700038	CF 680 OHM +-5% 1/16W
R2426	0700061	CF 33K OHM +-5% 1/16W
R2427	0700049	CF 4.7K OHM +-5% 1/16W
R2428	0700053	CF 8.2K OHM +-5% 1/16W
R2429	0114177	CF 4.7K OHM +-5% 1/4W
R2430	0100075	CF 2.7K OHM +-5% 1/8W
R2441	0100124	CF 300K OHM +-5% 1/8W
R2443	0700059	CF 27K OHM +-5% 1/16W
R2445	0700052	CF 6.8K OHM +-5% 1/16W
R2446	0700054	CF 10K OHM +-5% 1/16W
R2447	0700067	CF 100K OHM +-5% 1/16W
R2448	0700064	CF 56K OHM +-5% 1/16W
R2449	0700063	CF 47K OHM +-5% 1/16W
R2450	0700042	CF 1.2K OHM +-5% 1/16W
R2451	0100081	CF 4.7K OHM +-5% 1/8W
R2454	0700049	CF 4.7K OHM +-5% 1/16W
R2455	0700059	CF 27K OHM +-5% 1/16W
R2456	0700066	CF 82K OHM +-5% 1/16W
R2466	0700052	CF 6.8K OHM +-5% 1/16W

PRODUCT SAFETY NOTE: Components marked with a ⚠ have special characteristics important to safety. Before replacing any of these components, read carefully, the PRODUCT SAFETY NOTICE of this Service Manual. Don't degrade the safety of the receiver through improper servicing.

SYMBOL NO.	PART NO.	PART DESCRIPTION
R2470	0700067	CF 100K OHM +-5% 1/16W
R2471	0700054	CF 10K OHM +-5% 1/16W
R2473	0700051	CF 5.6K OHM +-5% 1/16W
R2474	0700051	CF 5.6K OHM +-5% 1/16W
R2479	0700066	CF 82K OHM +-5% 1/16W
R2480	0119514	FR 10 OHM +-5% 1/4W
R2481	0119514	FR 10 OHM +-5% 1/4W
R2482	0100121	CF 220K OHM +-5% 1/8W
R2483	0700044	CF 1.8K OHM +-5% 1/16W
R2501	0700027	CF 100 OHM +-5% 1/16W
R2502	0700051	CF 5.6K OHM +-5% 1/16W
R2503	0700027	CF 100 OHM +-5% 1/16W
R2504	0700054	CF 10K OHM +-5% 1/16W
R3006	0700027	CF 100 OHM +-5% 1/16W
R3007	0700027	CF 100 OHM +-5% 1/16W
R3010	0700027	CF 100 OHM +-5% 1/16W
R3013	0700027	CF 100 OHM +-5% 1/16W
R3014	0700041	CF 1K OHM +-5% 1/16W
R3021	0700027	CF 100 OHM +-5% 1/16W
R3024	0700027	CF 100 OHM +-5% 1/16W
R3025	0700061	CF 33K OHM +-5% 1/16W
R3028	0700054	CF 10K OHM +-5% 1/16W
R3029	0700027	CF 100 OHM +-5% 1/16W
R3030	0700027	CF 100 OHM +-5% 1/16W
R3031	0700054	CF 10K OHM +-5% 1/16W
R3032	0700058	CF 22K OHM +-5% 1/16W
R3033	0700058	CF 22K OHM +-5% 1/16W
R3034	0114133	CF 120 OHM +-5% 1/4W
R3038	0700054	CF 10K OHM +-5% 1/16W
R3047	0700061	CF 33K OHM +-5% 1/16W
R3048	0700058	CF 22K OHM +-5% 1/16W
R3049	0700032	CF 220 OHM +-5% 1/16W
R3050	0700048	CF 3.9K OHM +-5% 1/16W
R3051	0700047	CF 3.3K OHM +-5% 1/16W
R3053	0700051	CF 5.6K OHM +-5% 1/16W
R3054	0700067	CF 100K OHM +-5% 1/16W
R3055	0700041	CF 1K OHM +-5% 1/16W
R3056	0700037	CF 560 OHM +-5% 1/16W
R3064	0700041	CF 1K OHM +-5% 1/16W
R3065	0700041	CF 1K OHM +-5% 1/16W
R3066	0700041	CF 1K OHM +-5% 1/16W
R3075	0700027	CF 100 OHM +-5% 1/16W
R3076	0700027	CF 100 OHM +-5% 1/16W
R3077	0700041	CF 1K OHM +-5% 1/16W
R3078	0700041	CF 1K OHM +-5% 1/16W
R3079	0700027	CF 100 OHM +-5% 1/16W
R3080	0700041	CF 1K OHM +-5% 1/16W
R3081	0700027	CF 100 OHM +-5% 1/16W
R3082	0700041	CF 1K OHM +-5% 1/16W
R3083	0700027	CF 100 OHM +-5% 1/16W
R3084	0700041	CF 1K OHM +-5% 1/16W
R3085	0700041	CF 1K OHM +-5% 1/16W
R3086	0187038	CF 75 OHM +-5% 1/16W
R3087	0100123	CF 270K OHM +-5% 1/8W
R3088	0100123	CF 270K OHM +-5% 1/8W
R3089	0187038	CF 75 OHM +-5% 1/16W
R3090	0187038	CF 75 OHM +-5% 1/16W
R3091	0187038	CF 75 OHM +-5% 1/16W
R3092	0100123	CF 270K OHM +-5% 1/8W
R3093	0100123	CF 270K OHM +-5% 1/8W
R3094	0700067	CF 100K OHM +-5% 1/16W
R3095	0700067	CF 100K OHM +-5% 1/16W
R3096	0700067	CF 100K OHM +-5% 1/16W
R3097	0187036M	CF 62OHM +-5% 1/16W
R3098	0114141	CF 270 OHM +-5% 1/4W
R3099	0700034	CF 330 OHM +-5% 1/16W
R3100	0700041	CF 1K OHM +-5% 1/16W
R3101	0700041	CF 1K OHM +-5% 1/16W
R3117	0700041	CF 1K OHM +-5% 1/16W
R3118	0700041	CF 1K OHM +-5% 1/16W
R3119	0700041	CF 1K OHM +-5% 1/16W
R3128	0700041	CF 1K OHM +-5% 1/16W
R3129	0700067	CF 100K OHM +-5% 1/16W
R3130	0700041	CF 1K OHM +-5% 1/16W
R3131	0700054	CF 10K OHM +-5% 1/16W
R3134	0700034	CF 330 OHM +-5% 1/16W
R3135	0700067	CF 100K OHM +-5% 1/16W
R3136	0700067	CF 100K OHM +-5% 1/16W
R3504	0700051	CF 5.6K OHM +-5% 1/16W
R3505	0700051	CF 5.6K OHM +-5% 1/16W
R3507	0700029	CF 150 OHM +-5% 1/16W
R3512	0700059	CF 27K OHM +-5% 1/16W
R3513	0700029	CF 150 OHM +-5% 1/16W
R3514	0700061	CF 33K OHM +-5% 1/16W
R3517	0100055	CF 390 OHM +-5% 1/8W
R3527	0700067	CF 100K OHM +-5% 1/16W
R3528	0700058	CF 22K OHM +-5% 1/16W
R3529	0700058	CF 22K OHM +-5% 1/16W
R3531	0700029	CF 150 OHM +-5% 1/16W
R3533	0700061	CF 33K OHM +-5% 1/16W
R3534	0700051	CF 5.6K OHM +-5% 1/16W
R3536	0700065	CF 68K OHM +-5% 1/16W
R3538	0700058	CF 22K OHM +-5% 1/16W
R3539	0700054	CF 10K OHM +-5% 1/16W
R3540	0150114	VR 10K OHM-B
R3541	0700041	CF 1K OHM +-5% 1/16W
R3542	0700052	CF 6.8K OHM +-5% 1/16W
R3543	0700059	CF 27K OHM +-5% 1/16W
R3546	0700056	CF 15K OHM +-5% 1/16W
R3547	0700048	CF 3.9K OHM +-5% 1/16W
R3549	0700041	CF 1K OHM +-5% 1/16W
R3550	0700054	CF 10K OHM +-5% 1/16W
R3551	0700058	CF 22K OHM +-5% 1/16W
R3552	0700058	CF 22K OHM +-5% 1/16W
R3553	0700023	CF 47 OHM +-5% 1/16W
R3554	0700044	CF 1.8K OHM +-5% 1/16W
R3558	0700029	CF 150 OHM +-5% 1/16W
R3559	0700061	CF 33K OHM +-5% 1/16W

PRODUCT SAFETY NOTE: Components marked with a ⚠ have special characteristics important to safety. Before replacing any of these components, read carefully, the PRODUCT SAFETY NOTICE of this Service Manual. Don't degrade the safety of the receiver through improper servicing.

SYMBOL NO.	PART NO.	PART DESCRIPTION	SYMBOL NO.	PART NO.	PART DESCRIPTION
R3560	0187088	CF 9.1K OHM +-5% 1/16W	R3644	0700063	CF 47K OHM +-5% 1/16W
R3561	0700059	CF 27K OHM +-5% 1/16W	R3645	0700032	CF 220 OHM +-5% 1/16W
R3562	0700067	CF 100K OHM +-5% 1/16W	R3646	0700032	CF 220 OHM +-5% 1/16W
R3563	0700049	CF 4.7K OHM +-5% 1/16W	R3647	0700041	CF 1K OHM +-5% 1/16W
R3564	0700058	CF 22K OHM +-5% 1/16W	R4001	0700046	CF 2.7K OHM +-5% 1/16W
R3566	0150115	VR 20K OHM-B	R4002	0187082	CF 5.1K OHM +-5% 1/16W
R3567	0700049	CF 4.7K OHM +-5% 1/16W	R4003	0100125	CF 330K OHM +-5% 1/8W
R3568	0700056	CF 15K OHM +-5% 1/16W	R4004	0700054	CF 10K OHM +-5% 1/16W
R3570	0700051	CF 5.6K OHM +-5% 1/16W	R4005	0700045	CF 2.2K OHM +-5% 1/16W
R3571	0700051	CF 5.6K OHM +-5% 1/16W	R4006	0700061	CF 33K OHM +-5% 1/16W
R3572	0700047	CF 3.3K OHM +-5% 1/16W	R4007	0150157	VR 200K OHM-B RV-6
R3573	0700059	CF 27K OHM +-5% 1/16W	R4008	0100133	CF 680K OHM +-5% 1/8W
R3574	0700041	CF 1K OHM +-5% 1/16W	R4009	0150290	VR 50K OHM (B)
R3575	0700029	CF 150 OHM +-5% 1/16W	R4010	0150290	VR 50K OHM (B)
R3576	0700061	CF 33K OHM +-5% 1/16W	R4011	0100116	CF 130K OHM +-5% 1/8W
R3577	0700029	CF 150 OHM +-5% 1/16W	R4012	0700067	CF 100K OHM +-5% 1/16W
R3578	0100123	CF 270K OHM +-5% 1/8W	R4014	0700049	CF 4.7K OHM +-5% 1/16W
R3579	0700029	CF 150 OHM +-5% 1/16W	R4015	0700045	CF 2.2K OHM +-5% 1/16W
R3580	0700058	CF 22K OHM +-5% 1/16W	R4016	0700051	CF 5.6K OHM +-5% 1/16W
R3581	0700067	CF 100K OHM +-5% 1/16W	R4017	0700038	CF 680 OHM +-5% 1/16W
R3584	0700041	CF 1K OHM +-5% 1/16W	R4018	0700049	CF 4.7K OHM +-5% 1/16W
R3586	0700054	CF 10K OHM +-5% 1/16W	R4019	0700063	CF 47K OHM +-5% 1/16W
R3588	0700054	CF 10K OHM +-5% 1/16W	R402	0700054	CF 10K OHM +-5% 1/16W
R3589	0700058	CF 22K OHM +-5% 1/16W	R4020	0700057	CF 18K OHM +-5% 1/16W
R3590	0700054	CF 10K OHM +-5% 1/16W	R4021	0700047	CF 3.3K OHM +-5% 1/16W
R3591	0700041	CF 1K OHM +-5% 1/16W	R4022	0700037	CF 560 OHM +-5% 1/16W
R3593	0187078	CF 3.6K OHM +-5% 1/16W	R4023	0700038	CF 680 OHM +-5% 1/16W
R3594	0700034	CF 330 OHM +-5% 1/16W	R4024	0100115	CF 120K OHM +-5% 1/8W
R3595	0700027	CF 100 OHM +-5% 1/16W	R4025	0700049	CF 4.7K OHM +-5% 1/16W
R3596	0700043	CF 1.5K OHM +-5% 1/16W	R4028	0700066	CF 82K OHM +-5% 1/16W
R3597	0700029	CF 150 OHM +-5% 1/16W	R4029	0700041	CF 1K OHM +-5% 1/16W
R3598	0100037	CF 68 OHM +-5% 1/8W	R4030	0700038	CF 680 OHM +-5% 1/16W
R3599	0100045	CF 150 OHM +-5% 1/8W	R4031	0100115	CF 120K OHM +-5% 1/8W
R3606	0100065	CF 1K OHM +-5% 1/8W	R4032	0700051	CF 5.6K OHM +-5% 1/16W
R3607	0100065	CF 1K OHM +-5% 1/8W	R4033	0700049	CF 4.7K OHM +-5% 1/16W
R3608	0100065	CF 1K OHM +-5% 1/8W	R4034	0700045	CF 2.2K OHM +-5% 1/16W
R3609	0700058	CF 22K OHM +-5% 1/16W	R4035	0700049	CF 4.7K OHM +-5% 1/16W
R3610	0700041	CF 1K OHM +-5% 1/16W	R4036	0700038	CF 680 OHM +-5% 1/16W
R3611	0700039	CF 820 OHM +-5% 1/16W	R4037	0700063	CF 47K OHM +-5% 1/16W
R3625	0700027	CF 100 OHM +-5% 1/16W	R4038	0700057	CF 18K OHM +-5% 1/16W
R3628	0700041	CF 1K OHM +-5% 1/16W	R4039	0700047	CF 3.3K OHM +-5% 1/16W
R3630	0100131	CF 560K OHM +-5% 1/8W	R404	0700054	CF 10K OHM +-5% 1/16W
R3631	0179536	MG 1M OHM +-5% 1/8W	R4040	0700037	CF 560 OHM +-5% 1/16W
R3632	0100129	CF 470K OHM +-5% 1/8W	R4041	0700038	CF 680 OHM +-5% 1/16W
R3633	0700034	CF 330 OHM +-5% 1/16W	R4042	0100115	CF 120K OHM +-5% 1/8W
R3634	0700034	CF 330 OHM +-5% 1/16W	R4043	0700066	CF 82K OHM +-5% 1/16W
R3635	0700045	CF 2.2K OHM +-5% 1/16W	R4044	0700066	CF 82K OHM +-5% 1/16W
R3637	0700036	CF 470 OHM +-5% 1/16W	R4045	0700041	CF 1K OHM +-5% 1/16W
R3638	0187082	CF 5.1K OHM +-5% 1/16W	R4046	0700038	CF 680 OHM +-5% 1/16W
R3639	0700036	CF 470 OHM +-5% 1/16W	R4047	0100115	CF 120K OHM +-5% 1/8W
R3640	0187064	CF 910 OHM +-5% 1/16W	R4048	0700049	CF 4.7K OHM +-5% 1/16W
R3641	0700027	CF 100 OHM +-5% 1/16W	R4051	0700054	CF 10K OHM +-5% 1/16W
R3642	0187072	CF 2K OHM +-5% 1/16W	R4052	0700054	CF 10K OHM +-5% 1/16W
R3643	0700042	CF 1.2K OHM +-5% 1/16W	R4053	0700066	CF 82K OHM +-5% 1/16W

PRODUCT SAFETY NOTE: Components marked with a ⚠ have special characteristics important to safety. Before replacing any of these components, read carefully, the PRODUCT SAFETY NOTICE of this Service Manual. Don't degrade the safety of the receiver through improper servicing.

SYMBOL NO.	PART NO.	PART DESCRIPTION	SYMBOL NO.	PART NO.	PART DESCRIPTION
R407	0700065	CF 68K OHM +-5% 1/16W	R4153	0700029	CF 150 OHM +-5% 1/16W
R4070	0700045	CF 2.2K OHM +-5% 1/16W	R4156	0700054	CF 10K OHM +-5% 1/16W
R4071	0700045	CF 2.2K OHM +-5% 1/16W	R4157	0700045	CF 2.2K OHM +-5% 1/16W
R4089	0700048	CF 3.9K OHM +-5% 1/16W	R416	01195051	FR 2.2 OHM +-5% 1/4W
R409	0700036	CF 470 OHM +-5% 1/16W	R4160	0700054	CF 10K OHM +-5% 1/16W
R4090	0700048	CF 3.9K OHM +-5% 1/16W	R4161	0700045	CF 2.2K OHM +-5% 1/16W
R4091	0100047	CF 180 OHM +-5% 1/8W	R4162	0700041	CF 1K OHM +-5% 1/16W
R4092	0700054	CF 10K OHM +-5% 1/16W	R4163	0700046	CF 2.7K OHM +-5% 1/16W
R4095	0700054	CF 10K OHM +-5% 1/16W	R4164	0700041	CF 1K OHM +-5% 1/16W
R4096	0700054	CF 10K OHM +-5% 1/16W	R4165	0700046	CF 2.7K OHM +-5% 1/16W
R4103	0700054	CF 10K OHM +-5% 1/16W	R417	0114161	CF 1K OHM +-5% 1/4W
R4104	0700027	CF 100 OHM +-5% 1/16W	R419	0114161	CF 1K OHM +-5% 1/4W
R4105	0700027	CF 100 OHM +-5% 1/16W	R420	0700065	CF 68K OHM +-5% 1/16W
R4106	0700061	CF 33K OHM +-5% 1/16W	R422	0700065	CF 68K OHM +-5% 1/16W
R4107	0700058	CF 22K OHM +-5% 1/16W	R423	0700041	CF 1K OHM +-5% 1/16W
R4108	0700038	CF 680 OHM +-5% 1/16W	R425	0700063	CF 47K OHM +-5% 1/16W
R4109	0700049	CF 4.7K OHM +-5% 1/16W	R426	0700067	CF 100K OHM +-5% 1/16W
R4110	0700038	CF 680 OHM +-5% 1/16W	R428	0700058	CF 22K OHM +-5% 1/16W
R4111	0700049	CF 4.7K OHM +-5% 1/16W	R437	0700063	CF 47K OHM +-5% 1/16W
R4112	0100117	CF 150K OHM +-5% 1/8W	R438	0700061	CF 33K OHM +-5% 1/16W
R4113	0100116	CF 130K OHM +-5% 1/8W	R439	0700054	CF 10K OHM +-5% 1/16W
R4114	0150160	VR 10K 0HM-B +-30%	R440	0700054	CF 10K OHM +-5% 1/16W
R4119	0700041	CF 1K OHM +-5% 1/16W	R441	0700054	CF 10K OHM +-5% 1/16W
R4120	0700062	CF 39K OHM +-5% 1/16W	R4501	0147152	WW 27 OHM +-5% 3W
R4123	0700058	CF 22K OHM +-5% 1/16W	R5001	0700032	CF 220 OHM +-5% 1/16W
R4124	0700054	CF 10K OHM +-5% 1/16W	R5002	0700039	CF 820 OHM +-5% 1/16W
R4125	0700032	CF 220 OHM +-5% 1/16W	R5003	0700041	CF 1K OHM +-5% 1/16W
R4126	0700067	CF 100K OHM +-5% 1/16W	R5004	0700041	CF 1K OHM +-5% 1/16W
R4127	0700041	CF 1K OHM +-5% 1/16W	R5005	0700038	CF 680 OHM +-5% 1/16W
R4129	0700041	CF 1K OHM +-5% 1/16W	R5006	0114131	CF 100 OHM +-5% 1/4W
R413	01195051	FR 2.2 OHM +-5% 1/4W	R5007	0700059	CF 27K OHM +-5% 1/16W
R4130	0700062	CF 39K OHM +-5% 1/16W	R5008	0700041	CF 1K OHM +-5% 1/16W
R4131	0700054	CF 10K OHM +-5% 1/16W	R5009	0700041	CF 1K OHM +-5% 1/16W
R4132	0700041	CF 1K OHM +-5% 1/16W	R5010	0700063	CF 47K OHM +-5% 1/16W
R4133	0700041	CF 1K OHM +-5% 1/16W	R5011	0700027	CF 100 OHM +-5% 1/16W
R4134	0700034	CF 330 OHM +-5% 1/16W	R5012	0700037	CF 560 OHM +-5% 1/16W
R4135	0700032	CF 220 OHM +-5% 1/16W	R5013	0700041	CF 1K OHM +-5% 1/16W
R4136	0700067	CF 100K OHM +-5% 1/16W	R5015	0150111	VR 1K OHM-B
R4137	0700041	CF 1K OHM +-5% 1/16W	R5016	0700037	CF 560 OHM +-5% 1/16W
R4138	0700054	CF 10K OHM +-5% 1/16W	R5017	0700039	CF 820 OHM +-5% 1/16W
R4139	0700041	CF 1K OHM +-5% 1/16W	R5018	0150110	VR 500 OHM-B
R4140	0700041	CF 1K OHM +-5% 1/16W	R5019	0700041	CF 1K OHM +-5% 1/16W
R4141	0700034	CF 330 OHM +-5% 1/16W	R5020	0700034	CF 330 OHM +-5% 1/16W
R4142	0700045	CF 2.2K OHM +-5% 1/16W	R5021	0700041	CF 1K OHM +-5% 1/16W
R4143	0700045	CF 2.2K OHM +-5% 1/16W	R5022	0150112	VR 2K OHM-B
R4144	0700063	CF 47K OHM +-5% 1/16W	R5023	0700035	CF 390 OHM +-5% 1/16W
R4145	0700061	CF 33K OHM +-5% 1/16W	R5024	0700031	CF 180 OHM +-5% 1/16W
R4146	0700041	CF 1K OHM +-5% 1/16W	R5025	0700033	CF 270 OHM +-5% 1/16W
R4147	0700045	CF 2.2K OHM +-5% 1/16W	R5026	0700054	CF 10K OHM +-5% 1/16W
R4148	0700063	CF 47K OHM +-5% 1/16W	R5027	0700044	CF 1.8K OHM +-5% 1/16W
R4149	0700061	CF 33K OHM +-5% 1/16W	R5028	0700042	CF 1.2K OHM +-5% 1/16W
R4150	0700041	CF 1K OHM +-5% 1/16W	R5029	0700045	CF 2.2K OHM +-5% 1/16W
R4151	0700045	CF 2.2K OHM +-5% 1/16W	R5030	0700052	CF 6.8K OHM +-5% 1/16W
R4152	0700029	CF 150 OHM +-5% 1/16W	R5031	0700049	CF 4.7K OHM +-5% 1/16W

PRODUCT SAFETY NOTE: Components marked with a ⚠ have special characteristics important to safety. Before replacing any of these components, read carefully, the PRODUCT SAFETY NOTICE of this Service Manual. Don't degrade the safety of the receiver through improper servicing.

SYMBOL NO.	PART NO.	PART DESCRIPTION
R5032	0700045	CF 2.2K OHM +-5% 1/16W
R5033	0700032	CF 220 OHM +-5% 1/16W
R5034	0700037	CF 560 OHM +-5% 1/16W
R5503	0700039	CF 820 OHM +-5% 1/16W
R5504	0700037	CF 560 OHM +-5% 1/16W
R5505	0700061	CF 33K OHM +-5% 1/16W
R5506	0700054	CF 10K OHM +-5% 1/16W
R5508	0700032	CF 220 OHM +-5% 1/16W
R5509	0700054	CF 10K OHM +-5% 1/16W
R5510	0700041	CF 1K OHM +-5% 1/16W
R5512	0700034	CF 330 OHM +-5% 1/16W
R5513	0700039	CF 820 OHM +-5% 1/16W
R5514	0700037	CF 560 OHM +-5% 1/16W
R5515	0700029	CF 150 OHM +-5% 1/16W
R5516	0700063	CF 47K OHM +-5% 1/16W
R5518	0700042	CF 1.2K OHM +-5% 1/16W
R5522	0700041	CF 1K OHM +-5% 1/16W
R5524	0700052	CF 6.8K OHM +-5% 1/16W
R5528	0700055	CF 12K OHM +-5% 1/16W
R5529	0100129	CF 470K OHM +-5% 1/8W
R5530	0700061	CF 33K OHM +-5% 1/16W
R5531	0700027	CF 100 OHM +-5% 1/16W
R5533	0700027	CF 100 OHM +-5% 1/16W
R5534	0700054	CF 10K OHM +-5% 1/16W
R5537	0700054	CF 10K OHM +-5% 1/16W
R5538	0700065	CF 68K OHM +-5% 1/16W
R5539	0700066	CF 82K OHM +-5% 1/16W
R5540	0700054	CF 10K OHM +-5% 1/16W
R5541	0700067	CF 100K OHM +-5% 1/16W
R5542	0700054	CF 10K OHM +-5% 1/16W
R5543	0700054	CF 10K OHM +-5% 1/16W
R5544	0700065	CF 68K OHM +-5% 1/16W
R5545	0700054	CF 10K OHM +-5% 1/16W
R5546	0700059	CF 27K OHM +-5% 1/16W
R5547	0700047	CF 3.3K OHM +-5% 1/16W
R5548	0700061	CF 33K OHM +-5% 1/16W
R5549	0700067	CF 100K OHM +-5% 1/16W
R5550	0700054	CF 10K OHM +-5% 1/16W
R5553	0100119	CF 180K OHM +-5% 1/8W
R5555	0700042	CF 1.2K OHM +-5% 1/16W
R5559	0700027	CF 100 OHM +-5% 1/16W
R5561	0700051	CF 5.6K OHM +-5% 1/16W
R5562	0700033	CF 270 OHM +-5% 1/16W
R5564	0150113	VR 5K OHM-B RS-6
R5565	0700053	CF 8.2K OHM +-5% 1/16W
R5566	0700041	CF 1K OHM +-5% 1/16W
R5567	0700046	CF 2.7K OHM +-5% 1/16W
R5568	0700041	CF 1K OHM +-5% 1/16W
R5570	0700062	CF 39K OHM +-5% 1/16W
R5571	0700037	CF 560 OHM +-5% 1/16W
R5573	0700058	CF 22K OHM +-5% 1/16W
R5574	0700058	CF 22K OHM +-5% 1/16W
R5575	0100125	CF 330K OHM +-5% 1/8W
R5581	0700067	C F 100K OHM +-5% 1/16W
R5582	0700039	CF 820 OHM +-5% 1/16W
R5583	0700027	CF 100 OHM +-5% 1/16W
R5584	0700041	CF 1K OHM +-5% 1/16W
R5585	0700041	CF 1K OHM +-5% 1/16W
R5587	0150133	VR 500OHM-B
R5588	0700039	CF 820 OHM +-5% 1/16W
R5589	0150134	VR 1K OHM-B
R5590	0700044	CF 1.8K OHM +-5% 1/16W
R5591	0700041	CF 1K OHM +-5% 1/16W
R5597	0100049	CF 220 OHM +-5% 1/8W
R5598	0100049	CF 220 OHM +-5% 1/8W
R5599	0100049	CF 220 OHM +-5% 1/8W
R5602	0700041	CF 1K OHM +-5% 1/16W
R5603	0700054	CF 10K OHM +-5% 1/16W
R5604	0100051	CF 270 OHM +-5% 1/8W
R5606	0700054	CF 10K OHM +-5% 1/16W
R5609	0100065	CF 1K OHM +-5% 1/8W
R5610	0100065	CF 1K OHM +-5% 1/8W
R5611	0100065	CF 1K OHM +-5% 1/8W
R5612	0700038	CF 680 OHM +-5% 1/16W
R5618	0700041	CF 1K OHM +-5% 1/16W
R5619	0700041	CF 1K OHM +-5% 1/16W
R5620	0700041	CF 1K OHM +-5% 1/16W
R5624	0150133	VR 500OHM-B
R5625	0700032	CF 220 OHM +-5% 1/16W
R5626	0700054	CF 10K OHM +-5% 1/16W
R621	0700054	CF 10K OHM +-5% 1/16W
R622	0700049	CF 4.7K OHM +-5% 1/16W
R623	0700032	CF 220 OHM +-5% 1/16W
R624	0700043	CF 1.5K OHM +-5% 1/16W
R626	0700041	CF 1K OHM +-5% 1/16W
R627	0700052	CF 6.8K OHM +-5% 1/16W
R628	0700054	CF 10K OHM +-5% 1/16W
R629	0700045	CF 2.2K OHM +-5% 1/16W
R630	0700065	CF 68K OHM +-5% 1/16W
R631	0700051	CF 5.6K OHM +-5% 1/16W
R632	0700046	CF 2.7K OHM +-5% 1/16W
R634	0700027	CF 100 OHM +-5% 1/16W
R635	0150112	VR 2K OHM-B
R636	0700066	CF 82K OHM +-5% 1/16W
R639	0700051	CF 5.6K OHM +-5% 1/16W
R640	0700046	CF 2.7K OHM +-5% 1/16W
R641	0700027	CF 100 OHM +-5% 1/16W
R642	0700049	CF 4.7K OHM +-5% 1/16W
R643	0700054	CF 10K OHM +-5% 1/16W
R644	0700037	CF 560 OHM +-5% 1/16W
R645	0700066	CF 82K OHM +-5% 1/16W
R646	0700049	CF 4.7K OHM +-5% 1/16W
R647	0700057	CF 18K OHM +-5% 1/16W
R651	0113725	CF 100 OHM +-5% 1/2W
R652	0113725	CF 100 OHM +-5% 1/2W
R653	0113725	CF 100 OHM +-5% 1/2W
R654	0100065	CF 1K OHM +-5% 1/8W
R656	0100053	CF 330 OHM +-5% 1/8W

PRODUCT SAFETY NOTE: Components marked with a ⚠ have special characteristics important to safety. Before replacing any of these components, read carefully, the PRODUCT SAFETY NOTICE of this Service Manual. Don't degrade the safety of the receiver through improper servicing.

SYMBOL NO.	PART NO.	PART DESCRIPTION	SYMBOL NO.	PART NO.	PART DESCRIPTION
R659	0700041	CF 1K OHM +-5% 1/16W	R722	0100091	CF 12K OHM +-5% 1/8W
R660	0700064	CF 56K OHM +-5% 1/16W	R723	0700044	CF 1.8K OHM +-5% 1/16W
R661	0700054	CF 10K OHM +-5% 1/16W	R724	0700052	CF 6.8K OHM +-5% 1/16W
⚠R662	0150115	VR 20K OHM-B	R726	0700048	CF 3.9K OHM +-5% 1/16W
R663	0187110	CF 75K OHM +-5% 1/16W	R727	0700048	CF 3.9K OHM +-5% 1/16W
R664	0700038	CF 680 OHM +-5% 1/16W	R728	0700052	CF 6.8K OHM +-5% 1/16W
R665	0119722	MF 1 OHM +-5% 1W	R729	0113729	CF 150 OHM +-5% 1/2W
R666	0119722	MF 1 OHM +-5% 1W	R730	0110101	MF 15 OHM +-5% 1W
R667	0700051	CF 5.6K OHM +-5% 1/16W	R732	0110129	MF 220 OHM +-5% 1W
R668	0700061	CF 33K OHM +-5% 1/16W	R733	01195121	FR 1 OHM +-5% 1/4W
R669	0700064	CF 56K OHM +-5% 1/16W	R734	0119514	FR 10 OHM +-5% 1/4W
R670	0700065	CF 68K OHM +-5% 1/16W	R739	0110251	MF 1.8K OHM +-5% 2W
R671	0113766	CF 4.7K OHM +-5% 1/2W	⚠R742	0700063	CF 47K OHM +-5% 1/16W
R672	0110129	MF 220 OHM +-5% 1W	R744	0100127	CF 390K OHM +-5% 1/8W
R673	0700061	CF 33K OHM +-5% 1/16W	R745	0114149	CF 560 OHM +-5% 1/4W
R674	0114135	CF 150 OHM +-5% 1/4W	R751	0113719	CF 56 OHM +-5% 1/2W
R675	0113758	CF 2.2K OHM +-5% 1/2W	R753	0110361	MF 4.7K OHM +-5% 3W
R680	0700057	CF 18K OHM +-5% 1/16W	R754	0113766	CF 4.7K OHM +-5% 1/2W
R681	0700041	CF 1K OHM +-5% 1/16W	R755	0110363	MF 5.6K OHM +-5% 3W
R682	0700041	CF 1K OHM +-5% 1/16W	R766	0700041	CF 1K OHM +-5% 1/16W
R683	0700067	CF 100K OHM +-5% 1/16W	R767	0100079	CF 3.9K OHM +-5% 1/8W
R684	0700052	CF 6.8K OHM +-5% 1/16W	R768	0110225	MF 150 OHM +-5% 2W
R685	0700051	CF 5.6K OHM +-5% 1/16W	R769	0114177	CF 4.7K OHM +-5% 1/4W
R691	0700027	CF 100 OHM +-5% 1/16W	R770	0700046	CF 2.7K OHM +-5% 1/16W
R7001	0700056	CF 15K OHM +-5% 1/16W	R771	0700063	CF 47K OHM +-5% 1/16W
R7002	0700053	CF 8.2K OHM +-5% 1/16W	R772	0700054	CF 10K OHM +-5% 1/16W
R7003	0700041	CF 1K OHM +-5% 1/16W	R773	0100113	CF 100K OHM +-5% 1/8W
R7004	0700061	CF 33K OHM +-5% 1/16W	R774	0187098	CF 24K OHM +-5% 1/16W
R7005	0700049	CF 4.7K OHM +-5% 1/16W	R775	0700043	CF 1.5K OHM +-5% 1/16W
R7006	0700054	CF 10K OHM +-5% 1/16W	R776	0700051	CF 5.6K OHM +-5% 1/16W
R7007	0700054	CF 10K OHM +-5% 1/16W	R777	0700043	CF 1.5K OHM +-5% 1/16W
R7008	0700054	CF 10K OHM +-5% 1/16W	R779	0100065	CF 1K OHM +-5% 1/8W
R7009	0700044	CF 1.8K OHM +-5% 1/16W	R780	0100041	CF 100 OHM +-5% 1/8W
R7010	0700041	CF 1K OHM +-5% 1/16W	R781	0110279	MF 27K OHM +-5% 2W
R7011	0700057	CF 18K OHM +-5% 1/16W	R782	0110279	MF 27K OHM +-5% 2W
R7012	0700061	CF 33K OHM +-5% 1/16W	R783	0110279	MF 27K OHM +-5% 2W
R7013	0700051	CF 5.6K OHM +-5% 1/16W	R784	0110279	MF 27K OHM +-5% 2W
R7014	0700058	CF 22K OHM +-5% 1/16W	R785	0110279	MF 27K OHM +-5% 2W
R7016	0700054	CF 10K OHM +-5% 1/16W	R786	0114213	CF 33K OHM +-5% 1/4W
R7017	0700054	CF 10K OHM +-5% 1/16W	R790	0700053	CF 8.2K OHM +-5% 1/16W
R7018	0700066	CF 82K OHM +-5% 1/16W	R791	0700047	CF 3.3K OHM +-5% 1/16W
R7021	0700064	CF 56K OHM +-5% 1/16W	R792	0700059	CF 27K OHM +-5% 1/16W
R7022	0700054	CF 10K OHM +-5% 1/16W	R793	0700059	CF 27K OHM +-5% 1/16W
R7023	0700054	CF 10K OHM +-5% 1/16W	R794	0700045	CF 2.2K OHM +-5% 1/16W
R7024	0700057	CF 18K OHM +-5% 1/16W	R795	0700033	CF 270 OHM +-5% 1/16W
R707	0700039	CF 820 OHM +-5% 1/16W	R796	0700041	CF 1K OHM +-5% 1/16W
⚠R708	0110355	MF 2.7K OHM +-5% 3W	R797	0700052	CF 6.8K OHM +-5% 1/16W
R709	0113770	CF 6.8K OHM +-5% 1/2W	R798	0700058	CF 22K OHM +-5% 1/16W
⚠R710	0110351	MF 1.8K OHM +-5% 3W	R799	0700058	CF 22K OHM +-5% 1/16W
R711	0119688	MF 0.22 OHM +-5% 1W	R801B	0110371	MF 12K OHM +-5% 3W
R712	0100031	CF 39 OHM +-5% 1/8W	R801G	0110371	MF 12K OHM +-5% 3W
R719	0113787	CF 33K OHM +-5% 1/2W	R801R	0110371	MF 12K OHM +-5% 3W
R720	0113793	CF 56K OHM +-5% 1/2W	R802B	0110369	MF 10K OHM +-5% 3W
R721	0700049	CF 4.7K OHM +-5% 1/16W	R802G	0110369	MF 10K OHM +-5% 3W

PRODUCT SAFETY NOTE: Components marked with a ⚠ have special characteristics important to safety. Before replacing any of these components, read carefully, the PRODUCT SAFETY NOTICE of this Service Manual. Don't degrade the safety of the receiver through improper servicing.

SYMBOL NO.	PART NO.	PART DESCRIPTION
R802R	0110369	MF 10K OHM +-5% 3W
⚠R804B	0151635	VR 1M OHM-B
⚠R804G	0151635	VR 1M OHM-B
⚠R804R	0151635	VR 1M OHM-B
R805B	0179535	MG 680K OHM +-5% 1/2W
R805G	0179535	MG 680K OHM +-5% 1/2W
R805R	0179535	MG 680K OHM +-5% 1/2W
R806B	0179529	MG 10M OHM +-5% 1/2W
R806G	0179529	MG 10M OHM +-5% 1/2W
R806R	0179529	MG 10M OHM +-5% 1/2W
R807B	0100079	CF 3.9K OHM +-5% 1/8W
R808B	0100073	CF 2.2K OHM +-5% 1/8W
R809B	0100033	CF 47 OHM +-5% 1/8W
R810B	0100049	CF 220 OHM +-5% 1/8W
R810G	0100049	CF 220 OHM +-5% 1/8W
R810R	0100049	CF 220 OHM +-5% 1/8W
R811B	0100065	CF 1K OHM +-5% 1/8W
R811G	0100065	CF 1K OHM +-5% 1/8W
R811R	0100065	CF 1K OHM +-5% 1/8W
R812B	0100044	CF 130 OHM +-5% 1/8W
R812G	0100033	CF 47 OHM +-5% 1/8W
R812R	0100033	CF 47 OHM +-5% 1/8W
⚠R813G	01513341	VR 200 OHM-B
⚠R813R	01513341	VR 200 OHM-B
R815B	0100059	CF 560 OHM +-5% 1/8W
R815G	0100059	CF 560 OHM +-5% 1/8W
R815R	0100059	CF 560 OHM +-5% 1/8W
R817B	0100041	CF 100 OHM +-5% 1/8W
R817G	0100049	CF 220 OHM +-5% 1/8W
R817R	0100053	CF 330 OHM +-5% 1/8W
R818B	0100048	CF 200 OHM +-5% 1/8W
R819B	0179535	MG 680K OHM +-5% 1/2W
R819G	0179535	MG 680K OHM +-5% 1/2W
R819R	0179535	MG 680K OHM +-5% 1/2W
R820B	0113744	CF 560 OHM +-5% 1/2W
R820G	0113744	CF 560 OHM +-5% 1/2W
R820R	0113744	CF 560 OHM +-5% 1/2W
R901	0144151	WW 33 OHM +-5% 2W
R902	0139015	CC 1M OHM +-20% 1/2W
⚠R903	0147804	WW 0.75 OHM 15W
R905	0110169	MF 10K OHM +-5% 1W
R906	0700046	CF 2.7K OHM +-5% 1/16W
R907	0700047	CF 3.3K OHM +-5% 1/16W
R908	0700044	CF 1.8K OHM +-5% 1/16W
R909	0700038	CF 680 OHM +-5% 1/16W
R910	0148009	WW 0.056 OHM 2W
R911	0700058	CF 22K OHM +-5% 1/16W
R912	0700042	CF 1.2K OHM +-5% 1/16W
R913	0700047	CF 3.3K OHM +-5% 1/16W
R915	0700014	CF 10 OHM +-5% 1/16W
R916	0700043	CF 1.5K OHM +-5% 1/16W
R917	0700041	CF 1K OHM +-5% 1/16W
R918	0700047	CF 3.3K OHM +-5% 1/16W
R919	0700041	CF 1K OHM +-5% 1/16W

SYMBOL NO.	PART NO.	PART DESCRIPTION
R920	0700036	CF 470 OHM +-5% 1/16W
R921	0700055	CF 12K OHM +-5% 1/16W
R922	0700023	CF 47 OHM +-5% 1/16W
R923	0700047	CF 3.3K OHM +-5% 1/16W
R931	0114169	CF 2.2K OHM +-5% 1/4W
R932	0700027	CF 100 OHM +-5% 1/16W
R933	0700054	CF 10K OHM +-5% 1/16W
R934	0113719	CF 56 OHM +-5% 1/2W
R935	0700048	CF 3.9K OHM +-5% 1/16W
R936	0110237	MF 470 OHM +-5% 2W
R938	0113760	CF 2.7K OHM +-5% 1/2W
R939	0700056	CF 15K OHM +-5% 1/16W
R940	0700052	CF 6.8K OHM +-5% 1/16W
R941	0700041	CF 1K OHM +-5% 1/16W
R942	0700056	CF 15K OHM +-5% 1/16W
R943	0700041	CF 1K OHM +-5% 1/16W
R948	0119693	MF 0.39 OHM +-5% 1W
R949	0700054	CF 10K OHM +-5% 1/16W
R950	0700058	CF 22K OHM +-5% 1/16W
⚠R951	0113797	CF 82K OHM +-5% 1/2W
⚠R952	0700051	CF 5.6K OHM +-5% 1/16W
R953	0700063	CF 47K OHM +-5% 1/16W
R955	0700041	CF 1K OHM +-5% 1/16W
R956	0700045	CF 2.2K OHM +-5% 1/16W
R957	0700042	CF 1.2K OHM +-5% 1/16W
R981	0700054	CF 10K OHM +-5% 1/16W
R982	0700049	CF 4.7K OHM +-5% 1/16W
⚠R983	0700039	CF 820 OHM +-5% 1/16W
⚠R984	0700043	CF 1.5K OHM +-5% 1/16W
R986	0119514	FR 10 OHM +-5% 1/4W
R987	0114137	CF 180 OHM +-5% 1/4W
R988	0700046	CF 2.7K OHM +-5% 1/16W
R989	0700032	CF 220 OHM +-5% 1/16W
R990	0700041	CF 1K OHM +-5% 1/16W
R991	0700054	CF 10K OHM +-5% 1/16W
R994	0114161	CF 1K OHM +-5% 1/4W
		ICs
IC0001	2001762	IC M37204M8-657SP
IC0002	2007831	IC M6M80041P
IC0003	2366301	IC UPD4052BC
IC0004	2004951	IC LA7945
IC0005	2001752	IC LC7458A-02
IC0006	2008721	IC M62358P
IC0961	2003423	IC UPC7893AHF (LINEAR)
IC0962	2004665	IC PQ09RF21
IC0963	2003421	IC UPC7805AHF
IC1301	2003191	IC STK4274 (LINEAR)
IC1326	2003191	IC STK4274 (LINEAR)
IC1351	2003191	IC STK4274 (LINEAR)
IC1501	2380391	IC UPD6326C
IC2101	2383191	IC LA7990
IC2102	2914051	IC NJM4560D

PRODUCT SAFETY NOTE: Components marked with a ⚠ have special characteristics important to safety. Before replacing any of these components, read carefully, the PRODUCT SAFETY NOTICE of this Service Manual. Don't degrade the safety of the receiver through improper servicing.

SYMBOL NO.	PART NO.	PART DESCRIPTION
IC2103	2914051	IC NJM4560D
IC2104	2914051	IC NJM4560D
IC2105	2914051	IC NJM4560D
IC3001	2004792	IC SN76862NJ-09
IC3002	2004792	IC SN76862NJ-09
IC3003	2917391	IC MSC11371RS
IC4001	2004592	IC AN5817K
IC4004	2004362	IC CXA1279AS
IC4005	2917391	IC MSC11371RS
IC402	2004751	IC TA8200AH
IC5501	2020321	IC YAT015
IC601	2003541	IC LA7838 (LINEAR)
IC602	2380651	IC AN5551
⚠IC901	2373343	MODULE STR-M6511
⚠IC902	2000465	IC PS2501-1 (KD/LD) (PHOTO COUPLER)
⚠IC903	2000465	IC PS2501-1 (KD/LD) (PHOTO COUPLER)
⚠IC931	2381344	IC SE130N
IC933	2003413	IC UPC7912HF
IC935	2000632	IC SI-3120CA
		TRANSISTORS
Q0001	2320637	TR 2SA673C/D SI 80MHZ 400MW
Q0002	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q0003	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q0004	2320637	TR 2SA673C/D SI 80MHZ 400MW
Q0005	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q0006	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q0007	2320643	TR 2SC1213C SI 80MHZ 400MW
Q0008	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q0009	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q0010	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q0011	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q0012	2320643	TR 2SC1213C SI 80MHZ 400MW
Q0014	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q0015	2320643	TR 2SC1213C SI 80MHZ 400MW
Q0016	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q0017	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q0019	2323521	TR 2SD789 B/C/D/E
Q0020	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q0021	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q0022	2320637	TR 2SA673C/D SI 80MHZ 400MW
Q0024	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q0501	2320598	TR 2SC458B/C/D SI 230MHZ 200MW
Q0502	2312992	PHOTO TRANSISTOR PRT-38PT3F(M)
Q0503	2320637	TR 2SA673C/D SI 80MHZ 400MW
Q0504	2320598	TR 2SC458B/C/D SI 230MHZ 200MW
Q1101	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q2101	2320595	TR 2SC458(D) SI 230MHZ 200MW
Q2102	2320595	TR 2SC458(D) SI 230MHZ 200MW
Q2115	2320595	TR 2SC458(D) SI 230MHZ 200MW
Q2116	2320595	TR 2SC458(D) SI 230MHZ 200MW
Q2122	2320595	TR 2SC458(D) SI 230MHZ 200MW
Q2123	2320681	TR 2SA673A B/C SI 80MHZ 400MW
Q2124	2320681	TR 2SA673A B/C SI 80MHZ 400MW
Q2125	2320681	TR 2SA673A B/C SI 80MHZ 400MW
Q2126	2320595	TR 2SC458(D) SI 230MHZ 200MW
Q2130	2320595	TR 2SC458(D) SI 230MHZ 200MW
Q2131	2320595	TR 2SC458(D) SI 230MHZ 200MW
Q2133	2320595	TR 2SC458(D) SI 230MHZ 200MW
Q3001	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q3002	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q3003	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q3004	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q3005	2320637	TR 2SA673C/D SI 80MHZ 400MW
Q3503	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q3504	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q3508	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q3510	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q3513	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q3514	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q3516	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q3517	2320637	TR 2SA673C/D SI 80MHZ 400MW
Q3518	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q3519	2320637	TR 2SA673C/D SI 80MHZ 400MW
Q3520	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q3521	2326021	TR 2SC1741S
Q3523	2320637	TR 2SA673C/D SI 80MHZ 400MW
Q3524	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q3525	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q4001	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q4002	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q4003	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q4004	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q4005	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q4007	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q4008	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q4009	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q401	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q4010	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q4011	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q4012	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q4015	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q402	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q4021	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q4022	2320637	TR 2SA673C/D SI 80MHZ 400MW
Q4023	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q4024	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q4025	2320637	TR 2SA673C/D SI 80MHZ 400MW
Q4026	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q4027	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q4028	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q403	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q4030	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q4032	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q4033	2320637	TR 2SA673C/D SI 80MHZ 400MW
Q4034	2320637	TR 2SA673C/D SI 80MHZ 400MW
Q404	2320591	TR 2SC458B/C SI 230MHZ 200MW

PRODUCT SAFETY NOTE: Components marked with a ⚠ have special characteristics important to safety. Before replacing any of these components, read carefully, the PRODUCT SAFETY NOTICE of this Service Manual. Don't degrade the safety of the receiver through improper servicing.

SYMBOL NO.	PART NO.	PART DESCRIPTION
Q5001	2320596	TR 2SC458C/D SI 230MHZ 200MW
Q5002	2320596	TR 2SC458C/D SI 230MHZ 200MW
Q5003	2320596	TR 2SC458C/D SI 230MHZ 200MW
Q5004	2320596	TR 2SC458C/D SI 230MHZ 200MW
Q5005	2320596	TR 2SC458C/D SI 230MHZ 200MW
Q5006	2320596	TR 2SC458C/D SI 230MHZ 200MW
Q5007	2320637	TR 2SA673C/D SI 80MHZ 400MW
Q5008	2320596	TR 2SC458C/D SI 230MHZ 200MW
Q5009	2320596	TR 2SC458C/D SI 230MHZ 200MW
Q5501	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q5502	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q5503	2320637	TR 2SA673C/D SI 80MHZ 400MW
Q5505	2320637	TR 2SA673C/D SI 80MHZ 400MW
Q5506	2320637	TR 2SA673C/D SI 80MHZ 400MW
Q5507	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q601	2312171	TR 2SC3852
Q607	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q609	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q610	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q611	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q612	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q613	2320637	TR 2SA673C/D SI 80MHZ 400MW
⚠Q701	2326216	TR 2SC3116 S/T
Q707	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q708	2320637	TR 2SA673C/D SI 80MHZ 400MW
Q710	2312171	TR 2SC3852
Q711	2320663	TR 2SC1213AC SI 80MHZ 400MW
Q712	2320663	TR 2SC1213AC SI 80MHZ 400MW
Q713	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q714	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q715	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q716	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q717	2320663	TR 2SC1213AC SI 80MHZ 400MW
Q718	2320663	TR 2SC1213AC SI 80MHZ 400MW
Q720	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q721	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q722	2320637	TR 2SA673C/D SI 80MHZ 400MW
⚠Q777	2315273	TRANSISTOR 2SC4589-04
⚠Q780	2314991	TRANSISTOR 2SC4630
Q801B	2312651	TR 2SC3503 C/D/E/F
Q801G	2312651	TR 2SC3503 C/D/E/F
Q801R	2312651	TR 2SC3503 C/D/E/F
Q802B	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q802G	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q802R	2320591	TR 2SC458B/C SI 230MHZ 200MW
Q803B	2320637	TR 2SA673C/D SI 80MHZ 400MW
Q803G	2320637	TR 2SA673C/D SI 80MHZ 400MW
Q803R	2320637	TR 2SA673C/D SI 80MHZ 400MW
Q804B	2320591	TR 2SC458B/C SI 230MHZ 200MW
⚠Q902	2323782	TR 03P2M
Q903	2320665	TR 2SC1213A(D)
Q931	2323521	TR 2SD789 B/C/D/E
Q932	2312171	TR 2SC3852
Q933	2320637	TR 2SA673C/D SI 80MHZ 400MW

SYMBOL NO.	PART NO.	PART DESCRIPTION
Q934	2320637	TR 2SA673C/D SI 80MHZ 400MW
⚠Q935	2321112	TR 2SA778A
Q937	2326862	TR DTA114ES
Q938	2320637	TR 2SA673C/D SI 80MHZ 400MW
⚠Q940	2323782	TR 03P2M
Q941	2312171	TR 2SC3852
		DIODES
D0001	23383211	DI 1SS270
D0002	23383211	DI 1SS270
D0003	23383211	DI 1SS270
D0004	23383211	DI 1SS270
D0008	23383211	DI 1SS270
D0009	23383211	DI 1SS270
D0010	23383211	DI 1SS270
D0011	23383211	DI 1SS270
D0012	23383211	DI 1SS270
D0013	23383211	DI 1SS270
D0022	23383211	DI 1SS270
D0024	23383211	DI 1SS270
D0025	23383211	DI 1SS270
D0026	23383211	DI 1SS270
D0030	23383211	DI 1SS270
D0031	23383211	DI 1SS270
D0038	23383211	DI 1SS270
D0039	23383211	DI 1SS270
D0501	23383211	DI 1SS270
D0502	23383211	DI 1SS270
D0503	2339691	LED SLH-56VC77F
D1301	23394911	DI AM01Z
D2101	23383211	DI 1SS270
D2102	23383211	DI 1SS270
D2103	23383211	DI 1SS270
D2104	23383211	DI 1SS270
D2105	23383211	DI 1SS270
D2107	23383211	DI 1SS270
D2108	23383211	DI 1SS270
D2109	23383211	DI 1SS270
D3001	23383211	DI 1SS270
D3002	23383211	DI 1SS270
D3003	23383211	DI 1SS270
D3004	23383211	DI 1SS270
D3005	23383211	DI 1SS270
D3008	23383211	DI 1SS270
D3501	23383211	DI 1SS270
D3502	23383211	DI 1SS270
D3503	23383211	DI 1SS270
D3504	23383211	DI 1SS270
D3506	23383211	DI 1SS270
D3507	23383211	DI 1SS270
D3508	23383211	DI 1SS270
D3509	23383211	DI 1SS270
D3511	23383211	DI 1SS270

PRODUCT SAFETY NOTE: Components marked with a ⚠ have special characteristics important to safety. Before replacing any of these components, read carefully, the PRODUCT SAFETY NOTICE of this Service Manual. Don't degrade the safety of the receiver through improper servicing.

SYMBOL NO.	PART NO.	PART DESCRIPTION	
D3512	23383211	DI 1SS270	
D3516	23383211	DI 1SS270	
D3517	23383211	DI 1SS270	
D4001	23383211	DI 1SS270	
D4002	23383211	DI 1SS270	
D406	23383211	DI 1SS270	
D407	23383211	DI 1SS270	
D408	23383211	DI 1SS270	
D409	23383211	DI 1SS270	
D410	23383211	DI 1SS270	
D413	23383211	DI 1SS270	
D414	23383211	DI 1SS270	
D416	23383211	DI 1SS270	
D417	23383211	DI 1SS270	
D418	23383211	DI 1SS270	
D420	23383211	DI 1SS270	
D421	23383211	DI 1SS270	
D5503	23383211	DI 1SS270	
D5504	23383211	DI 1SS270	
D5507	23383211	DI 1SS270	
D5508	23383211	DI 1SS270	
D5509	23383211	DI 1SS270	
D5510	23383211	DI 1SS270	
D601	23383211	DI 1SS270	
D620	23383211	DI 1SS270	
D621	23383211	DI 1SS270	
D622	23383211	DI 1SS270	
D651	2338902	DI DFM1SA4	
D652	23394911	DI AM01Z	
D653	23394911	DI AM01Z	
D654	23394911	DI AM01Z	
D655	23383211	DI 1SS270	
D657	23383211	DI 1SS270	
D659	23383211	DI 1SS270	
D660	23394911	DI AM01Z	
D661	23383211	DI 1SS270	
⚠D701	2330564	DI V11N	SI
⚠D702	2338902	DI DFM1SA4	
D703	2330564	DI V11N	SI
D704	2330564	DI V11N	SI
⚠D705	2338902	DI DFM1SA4	
D706	2348511	DIODE RS3FS	
D707	2339531	DI RG4A	
D7070	2339531	DI RG4A	
D708	23383211	DI 1SS270	
D709	23383211	DI 1SS270	
D710	2334581	DI ES1A	SI
D711	23383211	DI 1SS270	
D712	23394911	DI AM01Z	
D713	23383211	DI 1SS270	
D714	23383211	DI 1SS270	
D715	23383211	DI 1SS270	
D716	23383211	DI 1SS270	
D722	23383211	DI 1SS270	
D722A	23383211	DI 1SS270	
D723	23383211	DI 1SS270	
D724	23383211	DI 1SS270	
D728	23383211	DI 1SS270	
D729	23383211	DI 1SS270	
D781	23383211	DI 1SS270	
D782	2349661M	DIODE SM-1XN02	
D801B	23383211	DI 1SS270	
D801G	23383211	DI 1SS270	
D801R	23383211	DI 1SS270	
⚠D901	2342061	DI D3SB(A)60	
⚠D903	23394811	DI AS01Z	
D904	23383211	DI 1SS270	
D905	23383211	DI 1SS270	
⚠D906	23394811	DI AS01Z	
⚠D931	2349661M	DIODE SM-1XN02	
⚠D932	23383211	DI 1SS270	
⚠D933	2349661M	DIODE SM-1XN02	
D934	23383211	DI 1SS270	
D935	23383211	DI 1SS270	
⚠D937	2338944	DI FML-G12S(F)	
⚠D938	2338944	DI FML-G12S(F)	
⚠D939	2338932	DI FMG-G36S	
⚠D940	2338944	DI FML-G12S(F)	
⚠D941	2338944	DI FML-G12S(F)	
⚠D942	2338944	DI FML-G12S(F)	
D945	23394911	DI AM01Z	
D946	23394911	DI AM01Z	
⚠D948	23383211	DI 1SS270	
⚠D949	23383211	DI 1SS270	
D951	23383211	DI 1SS270	
D952	23383211	DI 1SS270	
D953	23383211	DI 1SS270	
D954	23383211	DI 1SS270	
D957	23383211	DI 1SS270	
D958	23383211	DI 1SS270	
ZD0001	2334122	ZD RD5.1EB1	SI
ZD0002	2339844	ZD HZS6B1	
ZD0003	2339839	ZD HZS5C3	
ZD0004	2339885	ZD HZS12B2	
ZD0005	2339885	ZD HZS12B2	
ZD0007	2339849	DIODE-ZENER HZS6C3	
ZD0008	2335991	ZD HZT-33	
ZD0009	2339839	ZD HZS5C3	
ZD0010	2339885	ZD HZS12B2	
ZD0011	2339885	ZD HZS12B2	
ZD0012	2339885	ZD HZS12B2	
ZD0013	2339885	ZD HZS12B2	
ZD0015	2339885	ZD HZS12B2	
ZD0016	2339885	ZD HZS12B2	
ZD0017	2339885	ZD HZS12B2	
ZD0501	2339885	ZD HZS12B2	
ZD0502	2339885	ZD HZS12B2	
ZD1301	2334324	ZD RD36EB3	

PRODUCT SAFETY NOTE: Components marked with a ⚠ have special characteristics important to safety. Before replacing any of these components, read carefully, the PRODUCT SAFETY NOTICE of this Service Manual. Don't degrade the safety of the receiver through improper servicing.

SYMBOL NO.	PART NO.	PART DESCRIPTION
ZD1302	2334324	ZD RD36EB3
ZD1311	2334324	ZD RD36EB3
ZD1312	2334324	ZD RD36EB3
ZD1326	2334324	ZD RD36EB3
ZD1327	2334324	ZD RD36EB3
ZD1336	2334324	ZD RD36EB3
ZD1337	2334324	ZD RD36EB3
ZD1351	2334324	ZD RD36EB3
ZD1352	2334324	ZD RD36EB3
ZD1361	2334324	ZD RD36EB3
ZD1362	2334324	ZD RD36EB3
ZD1501	2331797	ZD HZ5C1
ZD2101	2334285	DIODE-ZENER RD24EB4
ZD2102	2334285	DIODE-ZENER RD24EB4
ZD2103	2334285	DIODE-ZENER RD24EB4
ZD2104	2334285	DIODE-ZENER RD24EB4
ZD2105	2334285	DIODE-ZENER RD24EB4
ZD2106	2334285	DIODE-ZENER RD24EB4
ZD2107	2334285	DIODE-ZENER RD24EB4
ZD2108	2334285	DIODE-ZENER RD24EB4
ZD2109	2334285	DIODE-ZENER RD24EB4
ZD2110	2334285	DIODE-ZENER RD24EB4
ZD2111	2334285	DIODE-ZENER RD24EB4
ZD2112	2334285	DIODE-ZENER RD24EB4
ZD3001	2339836	DIODE-ZENER HZS5B3
ZD3014	2331154	ZD HZ12 (A1-3/B1-3/C1-3)
ZD3022	2331154	ZD HZ12 (A1-3/B1-3/C1-3)
ZD4001	2339836	DIODE-ZENER HZS5B3
ZD4002	2339812M	DIODE-ZENER HZS3A2
ZD4003	2339812M	DIODE-ZENER HZS3A2
ZD5502	2339868M	ZD HZS9C2
ZD5503	2339868M	ZD HZS9C2
ZD5504	2339868M	ZD HZS9C2
ZD5510	2334324	ZD RD36EB3
ZD5514	2331849	ZD HZ-12(C3)
ZD5519	2339885	ZD HZS12B2
ZD5520	2339885	ZD HZS12B2
ZD5521	2339885	ZD HZS12B2
ZD5522	2339885	ZD HZS12B2
ZD5523	2339885	ZD HZS12B2
ZD5524	2339885	ZD HZS12B2
ZD5525	2334323M	DIODE-ZENER RD36EB2
ZD5526	2334285	DIODE-ZENER RD24EB4
ZD5527	2339868M	ZD HZS9C2
ZD5528	2331799	ZD HZ5(C)3 SI
ZD5529	2331799	ZD HZ5(C)3 SI
ZD5530	2331799	ZD HZ5(C)3 SI
ZD5531	2339885	ZD HZS12B2
ZD651	2331807	ZD HZ-6 (C1)
ZD652	2331154	ZD HZ12 (A1-3/B1-3/C1-3)
ZD653	2334243	ZD RD16E(B2)
ZD656	2334305	ZD RD30E (B4)
ZD709	2339612M	ZD HZS3BLL
⚠ZD710	2335461	ZD HZ24 (2L)

SYMBOL NO.	PART NO.	PART DESCRIPTION
ZD712	2334334	ZD RD39EB3
ZD713	2339889	ZD HZS12C3
ZD714	2339825	ZD HZS4B2
ZD715	2339889	ZD HZS12C3
ZD801B	2331827	ZD HZ-9 (C1)
ZD801G	2331827	ZD HZ-9 (C1)
ZD801R	2331827	ZD HZ-9 (C1)
⚠ZD902	2339223	ZD HZS27-3L
ZD904	2334304	ZD RD30EB3
ZD905	2334304	ZD RD30EB3
ZD931	2339885	ZD HZS12B2
⚠ZD932	2339231	ZD HZS30-1L
⚠ZD933	2339042	ZD HZS7A2L
ZD936	2335461	ZD HZ24 (2L)
ZD937	2331809	ZD HZ-6 (C3)
		TRANSFORMERS
⚠T701	2260291	HOLIZONTAL DRIVE TRANSFORMER
⚠T702	2436493	FLYBACK TRANSFORMER
⚠T703	2272762	SPC TRANSFORMER
⚠T901	2213993	POWER TRANSFORMER
⚠T902	2215594	SWITCHING TRANSFORMER
⚠T903	2215861	POWER TRANSFORMER
		FUSES
⚠F601	2722353	FUSE 1.6A
⚠F901	2722358	FUSE 5A
⚠F903	2722358	FUSE 5A
⚠F932	2722357	FUSE 4A
⚠F933	2722387M	FUSE 3A
⚠F934	2722387M	FUSE 3A
⚠F935	2722357	FUSE 4A
⚠F936	2722387M	FUSE 3A
⚠F937	2722353	FUSE 1.6A
		COMPOUND COMPONENTS
CP0001	2791754	DSS306-55B101M
CP0002	2791754	DSS306-55B101M
CP0003	2791754	DSS306-55B101M
CP0004	2791754	DSS306-55B101M
CP0005	2791754	DSS306-55B101M
CP0501	2381126	REMOTE CONTROL RECEIVER SPS-409-1F
⚠CP702	0150668	FOCUS PACK MHF174-09
⚠CP901	2793312	CAPRISTOR
⚠CP901A	2784342	CONDENSER COVER
CP902	2793312	CAPRISTOR
MF0001	2163972	CERAMIC FILTER 6MHZ
MF0002	2168831	CRYSTAL
MF5501	2786685	CRYSTAL
M302	2375511	CHIP BOARD HC3053S (P IN P UNIT)

PRODUCT SAFETY NOTE: Components marked with a ⚠ have special characteristics important to safety. Before replacing any of these components, read carefully, the PRODUCT SAFETY NOTICE of this Service Manual. Don't degrade the safety of the receiver through improper servicing.

SYMBOL NO.	PART NO.	PART DESCRIPTION
		COILS
L0001	2122956	LA AXIAL COIL 100 MICRO H +-10%
L0002	2122956	LA AXIAL COIL 100 MICRO H +-10%
L0003	2146091	COIL-OSC
L0004	2122956	LA AXIAL COIL 100 MICRO H +-10%
L0005	2122956	LA AXIAL COIL 100 MICRO H +-10%
L0011	2122956	LA AXIAL COIL 100 MICRO H +-10%
L0012	2122956	LA AXIAL COIL 100 MICRO H +-10%
L0013	2122956	LA AXIAL COIL 100 MICRO H +-10%
L1501	2120482	FILTER COIL 100 MICRO H +-10%
L2101	2120484	FILTER COIL
L2102	2120484	FILTER COIL
L2103	2120484	FILTER COIL
L2104	2120484	FILTER COIL
L2105	2120484	FILTER COIL
L2106	2120484	FILTER COIL
L3002	2120489	FILTER COIL 100 MICRO H +-10%
L3004	2120489	FILTER COIL 100 MICRO H +-10%
L3006	2220584	CHOKE COIL TSL0707330K
L3501	2120482	FILTER COIL 100 MICRO H +-10%
L3502	2166121	TRAP COIL 3.58MHZ
L3503	2122956	LA AXIAL COIL 100 MICRO H +-10%
L4001	2122253	LA AXIAL COIL 100 MICRO H
L401	2123461	FERRITE BEADS CORE
L402	2123461	FERRITE BEADS CORE
L404	2123461	FERRITE BEADS CORE
L5001	2141148	1H DL COIL
L5002	2122939	LA AXIAL COIL 5.6 MICRO H
L5503	2122949	LA AXIAL COIL 33 MICRO H +-10%
L5504	2120482	FILTER COIL 100 MICRO H +-10%
L5505	2120482	FILTER COIL 100 MICRO H +-10%
L701	2121181	FILTER COIL
L703	2124181	CHOKE COIL
L705	2120486	FILTER COIL 4700 MICRO H +-5%
L706	2124511	LINEARITY COIL
L707	2122095	FILTER COIL 27 MICRO H
L708	2120482	FILTER COIL 100 MICRO H +-10%
L709	2122094	FIXED COIL
⚠ L901	2123507	LINE FILTER
⚠ L902	2123507	LINE FILTER
⚠ L905	2124365	COIL
L906	2122653	FERRITE BEADS CORE
L912	2123469M	FERRITE BEADS CORE READ 2.3
L942	2161152	FILTER COIL
L943	2161152	FILTER COIL
L944	2161152	FILTER COIL
L945	2161152	FILTER COIL
L946	2161152	FILTER COIL
L947	2161152	FILTER COIL
L949	2161152	FILTER COIL
L950	2161152	FILTER COIL
L951	2161152	FILTER COIL
L953	2161152	FILTER COIL
		SWITCHES
S0501	2632851	TACTO SWITCH
S0502	2632901	KEY SWITCH
S4501	2622561	SLIDE SWITCH
S5502	2621051	SLIDE SWITCH
		MISCELLANEOUS
1	PH00446	CONTROL PANEL ASS'Y (HHEA MD) (HSCC MD)
2	81180100	HEX HEAD T-SCREW
3	81180114	8X1/4 T-SCREW
	3273431	CONTROL BUTTON (HHEA MD) (HSCC MD)
	8781642	4X12 TAPPING SCREW
	4137975	4X16 TAPPING SCREW WITH WASHER
	3204182	R/C LENS (HHEA MD) (HSCC MD)
4	4492092	LENS CRT METAL
5	3873612	PWB HOLDER
6	3204812	TERMINAL HOLDER ASS'Y (HHEA MD)
7	4519512	TAPPING SCREW 4X16 MM
8	4524911	HEXAGON FLANGEHEAD 4X12
9	4524911	HEXAGON FLANGEHEAD 4X12 (EXCEPT 55EX9
9	4524915	4X20 TAPPING SCREW (55EX9K ONLY)
10	3744173	CLAMPER
11	4519503	3X12 TAPPING SCREW
12	4137977	4X25 SELF TAPPING SCREW
13	4339596	MIRROR
14	4520232	4X16 DT SCREW
15	4520771	4x18 TAPPING SCREW W/ WASHER
16	81481118	8 X 1 1/8" SCREW
17	4331943	MIRROR HOLDER
18	KS00041	MIRROR-FRONT SURFACE
19	4331945	MIRROR HOLDER
	3700921	LAMP LENS (HHEA MD) (HSCC MD)
	3742021	LEAD HOLDER(CABINET)
	8781642	4X12 TAPPING SCREW
20	4137975	4X16 ZA R SCREW
21	3142632	CABINET ASS'Y (HHEA MD)(55EX9K)
21	QD00531	CABINET ASS'Y (HHEA MD)(50EX11BV)
21	QD00551	CABINET ASS'Y (HHEA MD)(50EX8K)
21	QD00552	CABINET ASS'Y (HHEA MD)(50EX10B)
22	H512101	MIRROR BOARD
23	4520771	4X18 TAPPING SCREW W/ WASHER
24	55050001	MIRROR BOARD
25	H512111	MIRROR CLEAT
26	55040002	MIRROR CLEAT
27	NT00075	SCREEN FRAME
28	NT00065	SCREEN FRAME
29	32110008	SPEAKER GRILL-LEFT
30	32110006	SPEAKER GRILL-CENTER
31	32110007	SPEAKER GRILL-RIGHT
32	NJ00571	VCR CONNECTOR TUBE

PRODUCT SAFETY NOTE: Components marked with a ⚠ have special characteristics important to safety. Before replacing any of these components, read carefully, the PRODUCT SAFETY NOTICE of this Service Manual. Don't degrade the safety of the receiver through improper servicing.

SYMBOL NO.	PART NO.	PART DESCRIPTION
33	H310121	PLASTIC RIVET
34	H512171	REAR BOARD
35	H512172	REAR BOARD
36	4517997	4X12 SELF TAPPING SCREW
	3727972	HOLDER-AC LINE CORD
	3744172	CLUMT 20
37	H520292	REARBOARD L(HHEA MD)
38	4304282	COVER NET
39	3103134	SCREEN FRAME 55H (HHEA MD)
40	3103135	SCREEN FRAME 55V (HHEA MD)
41	3830493	FRAME CORNER (HHEA MD)
42	4349013	FR. CRNR. METAL (HHEA MD)
43	4527631	4X18 TAPPING SCREW
48	3189844	SCREEN ASS'Y (HHEA MD)
44	3189843	SCREEN ASS'Y (HHEA MD)
45	3189764	SCREEN ASS'Y (HHEA MD)
46	32110010	SPEAKER GRILL
47	32110009	SPEAKER GRILL
⚠ 49	4876423	LENS CRT BLK ASS'Y B (HHEA MD) (HSCC MD)
⚠ 50	4876422	LENS CRT BLK ASS'Y G (HHEA MD) (HSCC MD)
⚠ 51	4876421	LENS CRT BLK ASS'Y R (HHEA MD) (HSCC MD)
⚠ 52	3393742	DELTA 77 A/B ASS'Y RB (HHEA MD) (HSCC MD)
⚠ 53	3393741	DELTA 77 A/B ASS'Y G (HHEA MD)(HSCC)
54	MK00121	METAL SHELF SUPPORT
55	PP00041	GLASS DOOR
56	NA01461	DOOR HINGE
57	NA01441	COUNTERPIECE
	H410301	HARDWARE KIT INCLUDES 54, 56, 57
DL5001	2151041	DELAY LINE AND B.P.F
DL5003	2794401	DELAY LINE
EFUS	2687791	F-US ADAPTOR
ERR	2902266	7P SUB MINI PLUG PIN
⚠ E101	2444875	DEFLECTION YOKE (HHEA MD) (HSCC MD)
E301	2573787	REM CONT CLU-682GJ (HHEA MD) (HSCC)(AP3
⚠ E801B	2698673	CPT SOCKET
⚠ E801G	2698673	CPT SOCKET
⚠ E801R	2698673	CPT SOCKET
E802	2661756	1P PLUG PIN WITH BASE
FE0001	2429691	FRONTEND V8-A68FT
JUSP	2994843	MINI PIN PLUG WITH COAXIAL CABLE
J3001	2672891	6P PIN JACK WITH S TERMINAL
J3002	2672894	5P PIN JACK
J4501	2672901	4P PUSH TERMINAL
ND707	2771894	FERRITE BEADS CORE 006
ND901	4520883	M3X12 SCREW WITH WASHER
ND939	4520883	M3X12 SCREW WITH WASHER
NF601	2721351	FUSE HOLDER
NF901	2721351	FUSE HOLDER
NF903	2721351	FUSE HOLDER
NF932	2721351	FUSE HOLDER
NF935	2721351	FUSE HOLDER
NF937	2721351	FUSE HOLDER
NIC901	4520883	M3X12 SCREW WITH WASHER
NIC933	4520883	M3X12 SCREW WITH WASHER
NIC935	4520883	M3X12 SCREW WITH WASHER
NI131B	4520885	M3X16 SCREW
NI131C	4518772	3X12 TNE
NI601B	4520883	M3X12 SCREW WITH WASHER
NQ710B	4520883	M3X12 SCREW WITH WASHER
NQ777B	4520883	M3X12 SCREW WITH WASHER
NQ777C	2771892	FERRITE BEADS CORE 004
NQ777D	2771893	FERRITE BEADS CORE
NQ780B	4520883	M3X12 SCREW WITH WASHER
NQ932	4520883	M3X12 SCREW WITH WASHER
NQ941	4520883	M3X12 SCREW WITH WASHER
NT902	4518772	3X12 TNE
N0932A	4520883	M3X12 SCREW WITH WASHER
N0962A	4520883	M3X12 SCREW WITH WASHER
N0963A	4520883	M3X12 SCREW WITH WASHER
N1030	4159427	3X10 TAPPING SCREW WITH WASHER
N1031D	4518772	3X12 TNE
N1032D	8815124	WASHER,LOCK 3MM
N1033	4518772	3X12 TNE
N1055	4159425	3X16 TAPPING SCREW
N1060	3746482	WIRE CLAMP
N1075	4159427	3X10 TAPPING SCREW WITH WASHER
N155	4524911	HEXAGON FLANGEHEAD 4X12
N157B	4524913	HEXAGON FLANGEHEAD 4X12 R
N157G	4524913	HEXAGON FLANGEHEAD 4X12 R
N157R	4524913	HEXAGON FLANGEHEAD 4X12 R
N302	4520883	M3X12 SCREW WITH WASHER
N402A	4520883	M3X12 SCREW WITH WASHER
N408B	3332021	EARTH SPRING
N408G	3332021	EARTH SPRING
N408R	3332021	EARTH SPRING
N409B	4159411	3X8 KNURL TAPPING SCREW
N409G	4159411	3X8 KNURL TAPPING SCREW
N409R	4159411	3X8 KNURL TAPPING SCREW
N801	3763751	SK BINDER
N803	4520881	M3X8 SCREW WITH WASHER
⚠ N9	2745414	POWER SUPPLY CORD
N9BFN	4520883	M3X12 SCREW WITH WASHER
N9N	4520881	M3X8 SCREW WITH WASHER
N9NN	4770601	3 FLANGE NUT
N9NR	4520883	M3X12 SCREW WITH WASHER
N901	3772201	AC CORD HOLDER
N907	3739671	CORD HOLDER
PCB	2661753	PIN PLUG WITH BASE
PCG	2661753	PIN PLUG WITH BASE
PCR	2661753	PIN PLUG WITH BASE
PD	2663135	PLUG PIN WITH BASE (6P)
PFJ	2902266	7P SUB MINI PLUG PIN
PKZ	2674631	5P CONNECTOR
PLG	2661756	1P PLUG PIN WITH BASE
PMB	2665272	4P PLUG PIN WITH BASE
PMG	2665272	4P PLUG PIN WITH BASE
PMR	2665272	4P PLUG PIN WITH BASE
PP31	2661751	PLUG PIN WITH BASE

PRODUCT SAFETY NOTE: Components marked with a ⚠ have special characteristics important to safety. Before replacing any of these components, read carefully, the PRODUCT SAFETY NOTICE of this Service Manual. Don't degrade the safety of the receiver through improper servicing.

SYMBOL NO.	PART NO.	PART DESCRIPTION	SYMBOL NO.	PART NO.	PART DESCRIPTION
PRR	2902266	7P SUB MINI PLUG PIN			
PS	2661752	PLUG PIN			
PS	2661942	CONNECTOR			
PSD1	2674631	5P CONNECTOR			
PSD2	2674635	10P CONNECTOR			
PSD3	2674634	8P CONNECTOR			
PSD4	2674635	10P CONNECTOR			
PSD5	2674631	5P CONNECTOR			
PSG	2661756	1P PLUG PIN WITH BASE			
PSL	2661944	CONNECTOR			
PTS	2663821	2P PLUG PIN			
⚠ RL901	2640572	POWER RELAY			
SG780	2340039	SPARK GAP			
SG781	2340039	SPARK GAP			
⚠ SG801B	2340039	SPARK GAP			
⚠ SG801	2340039	SPARK GAP			
⚠ SG801	2340039	SPARK GAP			
⚠ SG802B	2340039	SPARK GAP			
⚠ SG802	2340039	SPARK GAP			
⚠ SG802	2340039	SPARK GAP			
⚠ SP401	2412921	SPEAKER 160MM(55EX9K,50EX8K/10B)			
⚠ SP401	2415072	SPEAKER 120DG(50EX11BV)			
⚠ SP402	2412921	SPEAKER 160MM(55EX9K,50EX8K/10B)			
⚠ SP402	2415072	SPEAKER 120DG(50EX11BV)			
TH2101	2340552	THERMISTOR			
W811B	2692461	FOCUS LEAD WIRE (HHEA MD) (HSCC MD)			
W811G	2692461	FOCUS LEAD WIRE (HHEA MD) (HSCC MD)			
W811R	2692461	FOCUS LEAD WIRE (HHEA MD) (HSCC MD)			
X5501	2791505	CRYSTAL			

NOTES

HITACHI